
Kleinman Center for Energy Policy 2014–2015 Annual Report



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ABOUT US

The Kleinman Center for Energy Policy was established in July 2014 with a generous \$10 million gift to University of Pennsylvania's School of Design from Scott (C'94, W'94) and Wendy Kleinman. The Center is housed in Penn's historic Fisher Fine Arts Library and offers world-class teaching and event space, offices for visiting scholars and thought leaders, and research facilities for Center staff and students.

The Kleinman Center for Energy Policy at Penn invests substantial resources in pursuing innovation and generating globally significant impact on a critical issue of our time: energy policy. Our energy system faces mounting challenges, including structural inefficiencies and externalities, unstable markets subject to high-risk sources and supply chains, and threats to human health and natural resources. These challenges require advances in energy efficiency, technology development, and renewable energy, as well as the financing and policy instruments necessary to enable those advances. In order to pivot from an energy system with uncompensated external costs to one that optimizes energy productivity through smart demand, internalized carbon and other impacts, and sustainable supply, we need to incorporate a wide spectrum of ideas and interests.

Ke To work toward this, we tackle these challenges with what we call the *Kleinman Element*—the Center's unique approach to developing innovative energy policy. As you will discover in the following pages, the Kleinman Element strategically integrates three distinct focus areas: student education, faculty research, and stakeholder engagement. Rather than working with each group separately, the Center fosters collaboration among students, scholars, and decision-makers to generate meaningful advances in energy policy.

As a Center, we strive to:

1. Develop the next generation of energy leaders. We do this by designing new courses, undergraduate internships, graduate student research, and opportunities for professional development and applied experiences.
2. Support the collegial and productive conditions under which multidisciplinary and impactful energy-related research at Penn can flourish. We do this by supporting a competitive grants program and bringing the world's most distinguished energy leaders and scholars to Penn for visits and residencies.
3. Create the conditions for energy policy stakeholders to explore options and develop agendas. We do this by leveraging thought leadership and convening diverse interests in settings that foster innovation.

A LETTER FROM THE KLEINMAN CENTER DIRECTOR

Dear Friends,

We are delighted to present the first Annual Report of the Kleinman Center for Energy Policy. This report conveys the efforts and outcomes of our start-up year at the Center, a year devoted to attracting the best possible team of people for a variety of roles, constructing a productive and inspiring home for the Center, and establishing the programs and practices through which we will pursue our goals. During this whirlwind year, we have received extraordinary support from partners across the University, from deans and center directors across Penn's 12 schools to the Offices of the President and Provost, Facilities and Real Estate Services, General Counsel, Government Affairs, and Development. We are especially grateful to our colleagues in PennDesign, including department chairs, senior staff, and Dean Marilyn Taylor. This year has made us value even more deeply the privilege and pleasure of being part of Penn.

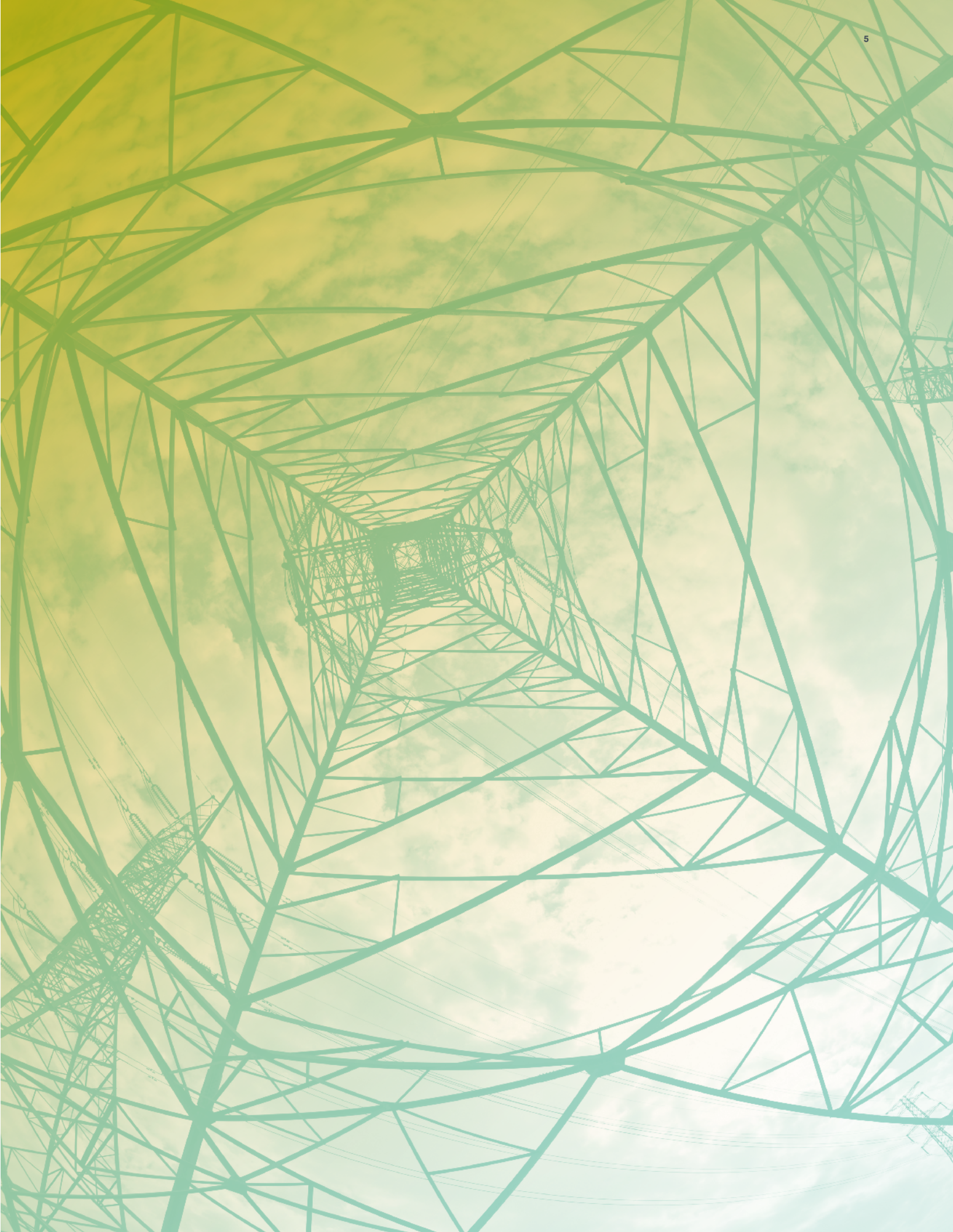
Of course, all of this is made possible by the extraordinary generosity of Scott (C'94, W'94) and Wendy Kleinman. The Kleinmans' generosity extends beyond their founding gift and continues with Mr. Kleinman's enthusiastic participation on the Center's Advisory Board and PennDesign's Board of Overseers. Scott's sense of stewardship is palpable, and the full measure of the tremendous effort described in this report can only be explained by the inspiration we all feel from working with him over the past year.

Housed at PennDesign in Penn's most iconic building, the Kleinman Center for Energy Policy is the place where students and faculty from Penn's 12 extraordinary schools and decision makers from the public, private, and civic sectors gather to learn, debate, and make important progress on the local, national, and global challenges of energy policy. We are pleased to present this Annual Report, which conveys our first year of progress toward that vision.

Best,



Mark Alan Hughes, PhD
Faculty Director, Kleinman Center for Energy Policy
Professor of Practice, PennDesign





THE LEGACY OF FISHER FINE ARTS: HOME OF THE KLEINMAN CENTER

The Kleinman Center occupies the upper floors of one of Penn's most iconic buildings, the Fisher Fine Arts Library. The building, designed by Frank Furness as the University's first library, was completed in 1891. Architectural historian George E. Thomas provides insight on Fisher's architectural significance: "In 1888, when most American architects were turning to marble classicism of the granite of Richardson's Romanesque, Furness designed the University of Pennsylvania's library in fiery red brick. Though there are hints of history in its gargoyles, Penn's new library was a conflation of towers, chimneys, skylighted rooms and foundry-like clerestoried halls whose closest sources were the factories of Philadelphia... In a city where machine form denoted purpose, it would only have been surprising had Furness not made his architecture of modern materials and in forms that reflected function. This quality animates Furness's best buildings such as the B&O station and the University Library. They have the raw impact of giant machines even as they transcended their materials to become a summa of the industrial age."

As Penn's main library moved into a new building in 1962, the Furness building became home to the Fine Arts Library and an array of architectural studios, including that of Louis I. Kahn, and lecture halls, including the one in which Ian McHarg taught Penn's most popular course in the 1960s and 1970s, "Man and the Environment." Fisher was listed in the National Register of Historic Places in 1985. The Kleinman Center is privileged to be the steward of the space where some of Penn's greatest intellectual leaders have worked on the greatest challenges of their day. We hope to continue the tradition.

ADVISORY BOARD



PAUL BONNEY

Senior Vice President &
General Counsel of
Constellation at Exelon Corporation

Paul Bonney is Senior Vice President and General Counsel of Constellation at Exelon Corporation. Mr. Bonney is also Deputy General Counsel and the chief regulatory lawyer for Exelon. He has held leadership roles with Exelon Corporation and PECO since 1990 and previously served as PECO's general counsel and vice president of regulatory affairs, where he was responsible for managing PECO's legal and regulatory matters. He also helped lead the company through major strategic initiatives, including restructuring to implement competitive wholesale and retail electric markets, as well as mergers and acquisitions. Prior to joining PECO in 1990, Mr. Bonney was an associate at Morgan, Lewis & Bockius and a law clerk to the Honorable Edward N. Cahn, U.S. District Court for the Eastern District of Pennsylvania. He also worked for National Economics Research Associates, an economic consulting firm in Washington, D.C., and at the Board of Trade in Chicago. Mr. Bonney received a bachelor's degree in economics from Duke University and a juris doctor degree from Georgetown University.



TERRY BOSTON

President & CEO, PJM

As President and Chief Executive Officer of PJM, Terry Boston oversees the largest power grid in North America and the largest electricity market in the world. Mr. Boston is also President of the Association of Edison Illuminating Companies, Inc., and immediate past president of the GO 15, the association of the world's largest power grid operators. Mr. Boston was recently elected to the National Academy of Engineering, one of the highest professional honors in the field. He is a member of the Board of Directors of the Electric Power Research Institute. Mr. Boston is past chair of the North American Transmission Forum, dedicated to excellence in performance and sharing industry best practices. He was also one of eight industry experts selected to direct the North American Reliability Corporation investigation of the August 2003 Northeast/Midwest blackout. Prior to joining PJM, Mr. Boston was the executive vice president of the Tennessee Valley Authority, the nation's largest public power provider. In his 35 years at TVA, Mr. Boston directed divisions in transmission and power operations, pricing, contracts, and electric system reliability.



MARK BROWNSTEIN

Vice President of the Climate and
Energy Program, Environmental
Defense Fund

Mark Brownstein is Vice President of the Climate and Energy Program at Environmental Defense Fund. Mr. Brownstein leads EDF's work on the oil and gas industry, with particular focus on methane emissions and the risks to public health and the environment associated with unconventional oil and gas development, and he specializes in a variety of electric and gas utility policy and regulatory issues. Mr. Brownstein is a member of the Electric Power Research Institute's Public Advisory Board and the Keystone Center Energy Board. He is also an adjunct professor of law at New York University Law School, where he co-teaches a seminar on public policy and energy project finance, and has taught energy policy at Columbia University's School of International and Public Affairs (SIPA). Prior to joining EDF, Mr. Brownstein held a variety of business strategy and environmental management positions within Public Service Enterprise Group (PSEG), one of the largest electric and gas utility holding companies in the United States. Mr. Brownstein's career includes time as an attorney in private environmental practice, an air quality regulator with the New Jersey Department of Environmental Protection, and an aide to a member of the U.S. House of Representatives. Mr. Brownstein holds a BA from Vassar College and a JD from the University of Michigan Law School.



SCOTT KLEINMAN

Lead Partner for Private Equity, Apollo

Founder, Kleinman Center for
Energy Policy at the University
of Pennsylvania

Scott Kleinman joined the Private Equity Group of Apollo in 1996. For the past decade, he has focused on Apollo's cyclical industrial businesses, including companies in the chemicals, forest products, and industrial sectors. In 2010, Mr. Kleinman was named Lead Partner for Private Equity at Apollo. Prior to 1996, he was employed by Smith Barney Inc. in its Investment Banking Division. Mr. Kleinman serves on the boards of directors of Momentive Performance Materials and Verso Paper. In 2014, Mr. Kleinman founded the Kleinman Center for Energy Policy at the University of Pennsylvania, where he is also a member of the Board of Overseers at the University of Pennsylvania School of Design. Mr. Kleinman received a BA and a BS from the University of Pennsylvania and the Wharton School, respectively, graduating magna cum laude, Phi Beta Kappa.



FERNANDO MUSA

CEO, Braskem America

Fernando Musa is CEO of Braskem America, based in Philadelphia, PA. In addition to his position as CEO of Braskem America, Mr. Musa oversees Braskem's European operations. In his most recent role, Mr. Musa served as Vice President of Planning, IT and Purchasing for Braskem S.A. In addition, he was responsible for quantiQ, Braskem's distribution business. Previously, he was responsible for the integration of Quattor, a Brazilian chemical and petrochemical company, after its acquisition by Braskem in 2010. Mr. Musa worked for 22 years at companies as diverse as Monitor Group (as Managing Partner), MGDK (as Founding Partner), Editora Abril, McKinsey, and Dow Chemical. Mr. Musa is a graduate of Instituto Tecnológico de Aeronáutica (ITA) in São José dos Campos, Brazil with a degree in mechanical engineering and received his MBA from INSEAD in France.



SONNY POPOWSKY

Vice Chair, Department of Energy's
Electricity Advisory Committee

Sonny Popowsky served as the Consumer Advocate of Pennsylvania from 1990 to 2012. He started his career at the Office of Consumer Advocate (OCA) as an Assistant Consumer Advocate in 1979. He served as the President of the National Association of State Utility Consumer Advocates (NASUCA) from 1996 to 1998 and was previously Chairman of the NASUCA Electric Committee. Mr. Popowsky served on the Board of Trustees of the North American Electric Reliability Council (NERC) from 1997 to 2001 and the NERC Stakeholders Committee from 2001 to 2006. In 2010, Mr. Popowsky was appointed to the Department of Energy's Electricity Advisory Committee and was named Vice Chair of that Committee in 2012. Mr. Popowsky also currently serves on the Advisory Council of the Electric Power Research Institute (EPRI), the Board of Directors of the Energy Coordinating Agency of Philadelphia, the Executive Council of the Pennsylvania AARP, and as a pro bono member of the Certification Decision Committee of the Center for Sustainable Shale Development. Mr. Popowsky graduated cum laude from Yale University and received his JD cum laude from the University of Pennsylvania.



MARVIN SCHLANGER

Chairman of the Board,
CEVA Group, plc

Marvin Schlanger is the former Chairman of the Supervisory Board of LyondellBasell Industries N.V., a \$50 billion global chemical producer, and is Chairman of the Board of CEVA Group, plc, a \$7 billion international logistics supplier. Mr. Schlanger began his career with Mobil and joined ARCO Chemical Company in 1975. He became Chief Financial Officer and a member of the board of directors in 1989, Chief Operating Officer in 1994, and was appointed President and CEO in 1998. Mr. Schlanger also serves on the boards of Taminco Global Chemical Holdings, LLP; UGI Corporation; UGI Utilities; Amerigas Partners LP; and Momentive Specialty Chemicals Holdings, LLC. Mr. Schlanger received his chemical engineering degree from Rutgers University and holds a Master of Science in Chemical Engineering from the University of Massachusetts.



MARILYN TAYLOR

Paley Professor, Dean
of the School of Design,
University of Pennsylvania

Marilyn Jordan Taylor is the Paley Professor and Dean of the School of Design at the University of Pennsylvania. Dean Taylor was Partner in Charge of the Urban Design and Planning Practice at Skidmore Owings & Merrill, LLP and the first woman to serve as chairman there. In addition to over 35 years at Skidmore Owings & Merrill, she was both the first architect and the first woman to serve as chairman (2005–07) of the Urban Land Institute, a nonprofit research and educational institution, where she championed a renewed focus on cities, sustainable communities, and infrastructure investment. Dean Taylor has served as a member of The Partnership for New York City; president of the American Institute of Architects (NYC Chapter); visiting professor at the Harvard Graduate School of Design; and as one of the founding members of the New York New Visions Design and Planning Coalition, the design, planning, and real estate communities' unprecedented response to the events of 9/11. She also serves on the Advisory Board of the Penn Institute for Urban Research. After graduating from Radcliffe College in 1969, Dean Taylor attended the MIT Graduate School of Architecture (1969–70), and received her M Arch in 1974 from the University of California, Berkeley.

STUDENT EDUCATION: ENGAGING THE NEXT GENERATION OF ENERGY POLICY LEADERS

The Kleinman Center's focus on students creates programming so any student—from those studying energy in doctoral programs to undergraduates with a new curiosity about policy—has the opportunity for an enhanced educational experience at Penn.

We aim to create opportunities for multidisciplinary engagement so all Penn students can leave the university informed about the opportunities and challenges we face in energy policy as a global community. We are laying the groundwork to shape the next generation of international energy policy leaders.



THE KLEINMAN ELEMENT
FOR STUDENTS

The Kleinman Element is the creative infrastructure assembled to support Penn students who want to explore energy policy in new ways. **The Kleinman Element for students is built from innovation, flexibility, and inclusiveness.** Students who come to the Center to experience the Element find a supportive, interdisciplinary community of student learners at various stages of their energy policy education. Our student programming is flexible and constantly evolving, and is built to accommodate diverse interests. Students who engage with the Kleinman Element are innovative and curious participants in the Center's many activities, including academic, research, professional development, and networking opportunities.

IN OUR FIRST YEAR, THE KLEINMAN CENTER CREATED NEW INFRASTRUCTURE ON PENN’S CAMPUS FOR UNDERGRADUATE AND GRADUATE STUDENTS TO STUDY, RESEARCH, AND IMPACT ENERGY POLICY ISSUES AT PENN AND BEYOND.

We reached students interested in exploring energy policy, introduced them to the Kleinman Center, and encouraged their participation and engagement in our new programming. We built a robust student website, which features regularly updated internships and job postings, highlights courses offered on campus, and shares information regarding faculty researchers, Penn organizations, and resources. As detailed in the following pages, the Center also built the infrastructure to support student-led research projects, fund professional development opportunities, and enrich energy policy curricula.

There are many meaningful examples of our progress, but perhaps none better than the launch of our competitive student grants program, which allows students and student groups to apply for Kleinman Center funding on a rolling basis. After only one semester, the Center received 17 grant proposals. Examples of accepted proposals include:

- The spring edition of *Penn Sustainability Review*, an impressive compilation of eight energy-focused articles written by Penn undergraduates and titled “Penn Sustainability Review Presents: The Future of Communicating Energy Policy.”
- Research on a new method of polystyrene synthesis and the creation of conductive polymers that act as a key input for highly efficient quantum LEDs, conducted by student Alexander Simafranca and Chemistry Professor David Chenoweth.

The grants program demonstrated the creativity of Penn students and validated the Center’s theory that there is vast interest in energy policy and energy efficiency on campus.

To leverage this interest, the Kleinman Center went to work connecting undergraduate and graduate students with faculty and other leaders in the public and private sectors. Through internships, research assistantships, guest lecturers, and events, the Center established the infrastructure to continue to enhance the Penn student experience. A few examples include:

COURSES SUPPORTED: 8 COURSES IN 5 SCHOOLS

GUEST LECTURES

The Center provided financial support to bring the following guest lecturers to campus to speak in undergraduate and graduate courses. Additionally, the Center co-hosted ancillary luncheons and public lectures with several of the visitors to extend the conversation to include the greater Penn community.

BEPP763: Energy Markets and Policy, Dr. Arthur van Benthem

- Kyle Bethancourt, *Managing Director, Sallyport Investments*



Above: The Spring edition of *Penn Sustainability Review* featured eight energy-focused articles written by Penn students.

Below: Undergraduate students were awarded travel grants from the Kleinman Center to study in Berlin and Rotterdam.

- Yoav Lurie, *CEO, SimpleEnergy*
- David Crane, *CEO, NRG*
- Albert Luu, *VP of Structured Finance, SolarCity*
- Ty Jagerson, *CEO, Village Power Finance*

FNCE756: Finance Energy, Dr. Erik Gilje

- Paul Lucas, *President & CEO, Adventure Exploration Partners*

ESE550: Advanced Transportation Seminar, Dr. Megan S. Ryerson

- Dr. Mark Hansen, *UC Berkeley*

KLEINMAN LECTURES

Center staff members were invited to give remarks on Kleinman-sponsored student opportunities and lecture on specific topics, including “Risk and Resilience in the Power Sector” (Dr. Mark Alan Hughes) and “History of Regional Energy Policy” (Christina Simeone). Additional opportunities arose from the lectures, including the Center’s collaboration with Dr. Ann Greene to incorporate new regional energy topics in her course syllabus.

STSC272: Energy in America, Dr. Ann Greene

ENVS601: Contemporary Environmental Issues, Dr. Yvette Bordeaux

LARP780: Designing with Risk, Ellen Neises & Matthijs Bouw

TEACHING ASSISTANT SUPPORT

LAW974, a new course offered by Professor Cary Coglianese, exposed students to cutting-edge research and analysis on regulatory performance. The course offered side-by-side discussion with faculty and staff involved in the Penn Program on Regulation’s Best-in-Class Regulator Initiative (BiC), a major research project funded by the Alberta Energy Regulator. The Kleinman Center offered support for the course’s teaching assistant.

LAW974: Defining & Achieving Regulatory Excellence, Dr. Cary Coglianese

Penn-in-Berlin & Rotterdam, a summer program and associated course for undergraduate students interested in policymaking and sustainability, included the addition of a section on Germany’s *Energiewende* (energy transformation). The Center provided financial assistance to students to partially cover program and travel fees associated with the course.

GRMN181: Penn Program in Rotterdam & Berlin, Dr. Simon Richter

STUDENT RESEARCH ASSISTANTS

Through strategic partnerships across the University, the Kleinman Center was able to support collaboration between students and faculty on a wide range of research projects,

all with timely, relevant policy implications. In addition to hiring four students to assist with Kleinman Center publications and research efforts, the Center supported faculty–student collaboration through:

Center for Undergraduate Research and Fellowships (CURF): Partnered 3 faculty and 4 students

- Varieties in Petrostates, Professor Rudra Sil (SAS) and student Jillian Moely (SAS)
- Engineering Quantum Dots for Efficient Solar Photovoltaic Devices, Professor Cherie Kagan (SEAS) and student Ana Cohen (SAS)
- How to Make Oil Companies Safer, Professor Natalya Vinokurova (Wharton) and students Joshulyne Park (SAS) and Elena Rohner (SAS)

Penn Program on Regulation (PPR): Partnered 1 faculty with 1 student

- Alberta Energy Regulator, Best-in-Class Regulator Initiative, Dr. Chris Carrigan (Trachtenberg School of Public Policy and Public Administration, George Washington University) and student Elise Harrington (PennDesign)

Kleinman Center Student Research Grants: Partnered 2 faculty with 2 students

- Advances in the Field of Quantum LEDs, Professor David Chenoweth (SAS) and student Alexander Simafranca (SAS)
- Global Renewable Energy Education Network—Geothermal Case Study in Iceland, Professor Andy Huemmler (SEAS) and student Sarah Burns (SAS)

Kleinman Center Faculty Research Grants: Partnered 3 faculty with 4 students

- Airline Fuel Loading: Existing Airline Practices and Future Federal Regulations, Professor Megan Ryerson (PennDesign) and students Zhaoyu Li (SEAS) and Ivan Tereshchenko (PennDesign)
- Air Quality, Electric Vehicles and the Motorcycle City—Solo, Indonesia, Professor Erick Guerra (PennDesign) and student Lucia Artavia (PennDesign)
- Incentive Pass-through for Residential Solar Systems, Ruben Lobel (Wharton) and PhD candidate Jacquelyn Pless (Colorado School of Mines)

INTERNSHIPS

Partnering with the Initiative for Global Environmental Leadership (IGEL) and the Penn Wharton Public Policy Initiative (PWPPI), the Kleinman Center cosponsored four summer interns to work at the intersection of energy and policy. These students, who received full funding to cover their summer living expenses during their 10–12 week internships, interned with the federal government, think tanks, and nonprofit organizations.

- Andrew Klimaszewski (SAS) U.S. Energy Information Administration
- Shams Haidari (SAS) Brookings Institute, Energy Security and Climate Initiative
- Benjamin Nathan (PennDesign) The World Bank Group
- Alexandra Hilgeman (SAS) Chariot Energy

FACULTY RESEARCH: SUPPORTING RESEARCH WITH HIGH IMPACT POTENTIAL

Academic research has the ability to significantly impact energy policy at the regional, national, and international scale.

There is a growing need for rigorous technical analysis, modeling, and both qualitative and quantitative research in current energy debates, making scholars well-positioned to contribute to public policy progress.



THE KLEINMAN ELEMENT FOR FACULTY

The Kleinman Element creates the conditions under which academic research can support energy policy outcomes. **The Kleinman Element for faculty is built from productivity, rigor, and collaboration.** Faculty who come to the Center to experience the Element find resources, opportunities, and connections that support the design and creation of rigorous academic studies that are timely and relevant to energy policy discourse. Ultimately, Kleinman-supported research initiatives will be used to educate fellow academics, students, decision makers, and the general public. Faculty who engage with the Element are committed to cross-disciplinary collaborations and exploring the potential impact of their research on energy policy.

MORE INFORMATION ABOUT
OUR FIRST YEAR SUPPORTED
RESEARCH INITIATIVES CAN
BE FOUND AT:

*kleinmanenergy.upenn.edu/
faculty-research-grants*

ELECTRIC MOTORCYCLES FOR THE
MOTORCYCLE CITY

Author: *Dr. Erick Guerra, School of Design*

Funded by the Kleinman Center for Energy Policy, the University of Pennsylvania Urban Transportation Systems Group, and Carnegie-Mellon University, PennDesign's Dr. Erick Guerra is working to evaluate the extent to which electric motorcycles, or e-bikes, are a potential replacement for gasoline-powered motorcycles. His research will determine the price point at which consumers are willing to adopt e-bikes in Solo, Indonesia, a city with a long history of motorcycle use.

A number of cities, particularly in Southeast Asia, have adopted the motorcycle as the primary means of urban transportation. Relatively high yet flat population and job densities combined with a uniformly distributed road network and narrow streets make the motorcycle a convenient and affordable choice for point-to-point travel. However, inexpensive motorcycles operating on gasoline that is often adulterated produce high levels of local pollution, reduce life expectancy, and cause harmful respiratory diseases, particularly in the young and elderly. In many countries like Indonesia, reliance on gasoline for personal travel makes it difficult to reduce or remove expensive and economically misleading fuel subsidies.

Dr. Guerra will produce a research digest published by the Kleinman Center in Fall 2015.

AIRLINE FUEL LOADING:
EXISTING AIRLINE PRACTICES AND
FUTURE FEDERAL REGULATIONS

Author: *Dr. Megan Ryerson, School of Design and the School of Engineering and Applied Science*

Co-author: *Dr. Mark Hansen, UC Berkeley*

Funded by the Federal Aviation Administration (FAA) with support from the Kleinman Center, Dr. Megan Ryerson and Dr. Mark Hansen are investigating changes in FAA policy regarding airline discretionary fuel loads. After establishing the cost of carrying discretionary fuel, Dr. Ryerson's research will focus on the structure and impact of new federal

regulations on discretionary fuel. Should the FAA set limits on the quantity of discretionary fuel that can be loaded? How would airlines adopt such limits?

While all flights must carry enough fuel to execute the mission as planned (called "mission fuel") as well as a federally-mandated amount of fuel to provide a buffer for any unplanned events during the flight (called "reserve fuel"), flights may also carry discretionary fuel. This discretionary fuel provides an extra buffer above and beyond the reserve fuel; however, because aircraft fuel consumption is related to weight, there is a cost to carrying discretionary fuel in terms of additional fuel burned.

Dr. Ryerson will publish a research digest with the Center in Fall 2015 while working toward a peer-reviewed journal publication once the full results are available.

A RESEARCH AGENDA FOR TRIBOLOGY

Author: *Dr. Robert Carpick, School of Engineering and Applied Science*

Co-author: *Dr. Andrew Jackson, School of Engineering and Applied Science*

Through a research grant from the Advanced Research Projects Agency-Energy (ARPA-E), the Kleinman Center is supporting Professor Robert Carpick and Professor of Practice Andrew Jackson in the identification, investigation, and quantification of engineering advances with commercial potential in the field of tribology. Tribology—the science of friction, wear, and lubrication—offers the potential for massive reductions in energy use by reducing friction (i.e. wasted energy) and wear, which lead to energy consumption to produce replacement materials and parts as well as down-time of manufacturing and all other manners of economic activity. Professors Carpick and Jackson will focus on identifying strategies with the optimal combination of energy savings and potential for commercial deployment in energy production, transportation, and conversion. The Center is directly involved and participating in the identification of policy and regulatory mechanisms to catalyze the adoption and deployment of friction-reduction technology.

BEST-IN-CLASS INITIATIVE FOR THE
ALBERTA ENERGY REGULATOR

Principle Investigator: *Dr. Cary Coglianese, Penn Law*

The Kleinman Center collaborated with Professor Cary Coglianese, Director of the Penn Program on Regulation, on the Best-in-Class Regulator Initiative. Funded by the Alberta Energy Regulator (AER) and drawing on public consultation as well as analysis from an international team of experts at Penn and beyond, the Best-in-Class Regulator Initiative (goo.gl/6aZtu2) generated a framework for identifying and achieving important organizational, legal, policy, and deliberative responsibilities facing energy regulators and other regulatory authorities around the world. The Best-in-Class (BiC) Initiative explored the core attributes of regulatory excellence so as to develop a forward-looking, generalizable framework.

Several Kleinman Center staff participated in BiC proceedings and expert dialogues. Additionally, Research Assistant Elise Harrington co-authored a paper (goo.gl/vBs9kZ) for the project on regulatory instrument choice and enforcement, or more broadly, regulatory problem-solving.

THE ECONOMICS OF MPG CLAIMS:
THEORY AND EVIDENCE

Author: *Dr. Arthur van Benthem, the Wharton School*

Co-authors: *Dr. Sébastien Houde, University of Maryland and Dr. Kenneth Gillingham, Yale University*

The Kleinman Center provided a matching grant to Dr. Arthur van Benthem and colleagues to study the economics of miles per gallon (MPG) claims. The project investigates how advertising influences the demand for vehicles of different fuel economies as well as the overall emissions profile of the car fleet. The findings will shed light on the role of advertising in meeting tightened fuel economy standards.

Car manufacturers in the U.S. are required to meet corporate average fuel economy (CAFE) standards. These standards consist of yearly targets for sales-

weighted fuel economy averages that each manufacturer must achieve or attain by purchasing compliance credits. While manufacturers and dealers are required to disclose fuel economy information through a mandated labeling program, advertising is the primary mechanism for sharing this information with consumers.

Some vehicle manufacturers attempt to achieve compliance by increasing sales of models that over-comply with the standards through aggressive advertising. Dr. van Benthem and his team are studying whether manufacturers advertise more when facing increasingly high standards, a question that is particularly relevant with the upcoming tightening of the CAFE standards from 2017–2025.

Dr. van Benthem and colleagues will produce two research digests published by the Kleinman Center, an analysis of CAFE standards and their implications and a synopsis of the study's policy and regulatory conclusions.



KLEINMAN POLICY PROJECTS: FILLING CRITICAL NEEDS WITH STRATEGIC CAPACITY

Contemporary energy policy decision-making must balance myriad considerations that are technically complex, economically volatile, and politically controversial.

As our knowledge about the costs and benefits of energy choices expands, decisions about these tradeoffs often become more complex and compromise becomes less achievable. The Kleinman Center's policy projects aim to fill a critical gap that exists in current energy policy discourse by facilitating practical compromise among vital stakeholders.



THE KLEINMAN ELEMENT FOR POLICY

The Kleinman Element is a set of core principles that define the Center's evolving policy work. **The Kleinman Element for stakeholder engagement on policy work is built from strategy, engagement, and integrity.** This means that the Center chooses projects where our resources can have the greatest impact. This strategy is based on timing, potential, and opportunity. Our projects identify, convene, and engage diverse and critical stakeholders that are needed to make change. And, finally, our projects depend on and exhibit the utmost integrity. At our core, we are committed to consistently delivering a fair and transparent method for cultivating trust.

THE KLEINMAN CENTER AIMS TO CULTIVATE COMPROMISE BY APPLYING ITS COMPETITIVE STRENGTHS TO A STRATEGIC POLICY AGENDA.

The Center has established this strategic policy agenda by focusing on issues that:

- are timely,
- can be informed or impacted by the work of the Center,
- attract and engage critical stakeholders, and
- comprise a diverse portfolio with respect to geography, sector, and energy sources.

The Kleinman Center offers truly unique capacity and strengths to support a strategic policy agenda, including:

- Convening Stakeholders—Bringing together energy policy stakeholders in a fair process for open discussion in a safeguarded environment.
- Providing Education—Providing expert education to stakeholders through access to industry, technical, academic, and thought leaders.
- Facilitation—Providing subject matter experts with the coordination, mediation, and facilitation skills needed to achieve compromise among stakeholders where possible.
- Unique Infrastructure—Providing a unique perspective on energy policy discourse as a non-stakeholder with expert and financial resources to contribute.
- Research Capabilities—Maintaining the potential to draw upon staff, student, and faculty resources to provide research capacity where appropriate.

FIRST YEAR PROJECTS

More details on the Kleinman Center’s policy projects can be found at: kleinmanenergy.upenn.edu/policy

SEEKING AN ENERGY VISION FOR PHILADELPHIA

Dr. Mark Alan Hughes, Project Lead

Issue Challenge

Explore the possibility of generating a broadly shared vision of energy for the Philadelphia region that is prosperous, equitable, sustainable, healthy, safe, and secure. No process currently exists that makes possible the discovery and development of such a broadly shared vision, and the issue has grown increasingly contentious.

Cultivating Compromise and Building Partnerships

The Center and Drexel University’s Institute for Energy and Environment have partnered to lead this effort. The organizations have interviewed over 30 key stakeholders to identify individuals that embody both the required knowledge and the spirit of compromise needed for productive dialogue.

Process Integrity

The Center has engaged Raab Associates, one of the nation’s leading facilitators of energy issues in both the public and private sectors, to help design and facilitate a structured process.

Looking Forward

The Center plans to continue interviewing stakeholders, launch the first stakeholder meetings in October 2015, and complete the process in early 2016. The anticipated outcome is a shared vision statement and list of common concerns that bring stakeholders together as a constituency to help make decisions at various levels of government and across various domains of policy and regulation.

EXPLORING THE UTILITY OF THE FUTURE IN PENNSYLVANIA

Christina Simeone, Project Lead

Issue Challenge

Electric utilities in Pennsylvania and across the nation are being confronted with competing pressures—changing technologies, increasingly strict policy requirements, evolving consumer preferences, and aging infrastructure—that threaten the viability of their traditional business model. The first phase of this project aims to engage state stakeholders in identifying key challenges within the existing business model, exploring opportunities for potential exploration, and understanding stakeholder preferences for cultivating a vision for the future of utilities.

Creating Support

The Center worked pragmatically with members of the electric utility industry to provide background research and information, understand concerns, examine opportunities, and generate support for analyzing the future of utilities. An invitation-only meeting with various Pennsylvania electric utility interests was held on June 1, 2015, complete with expert speakers and a facilitated session of dialogue. The primary outcome of the meeting was widespread interest and support for engaging other key stakeholders to participate.

Looking Forward

The phase I process includes a regulator and consumer advocate stakeholder meeting on August 4, 2015 and a vendor

and advocate meeting on August 5, 2015. The meetings include background materials published by the Center (goo.gl/QQbu7N), presentations from national experts, and facilitated sessions aimed at understanding stakeholder perspectives. The Center will publish a proceeding report summarizing these perspectives. The Center will then work with stakeholders to explore a phase II process that focuses on developing consensus recommendations for the genesis of a future utility vision.

ACCELERATING ENERGY STORAGE

Ken Kulak, Project Lead

Issue Challenge

Energy storage has the potential to dramatically alter the economics of generation, transmission, and distribution and to deliver lower-cost energy with reduced emissions. Typically perceived as being prohibitively expensive, a combination of factors—declining costs, growth in distributed generation, new regulatory initiatives, and innovative financing arrangements—are forcing a reassessment of storage deployment timelines. The Center aims to organize a series of invitation-only events to examine policies that facilitate financial investment in energy storage and accelerate commercial deployment.

Uncommon Diversity

On June 11, 2015, the Kleinman Center hosted the first meeting in the energy storage series, titled “Accelerating Energy Storage: Policies for Facilitating Investment and Deployment.” The invitation-only conference brought together an uncommon set of stakeholders ranging from Wall Street investors and analysts to public sector regulators, project developers, grid system operators, and electric utilities. The agenda provided a comprehensive view of the evolving value proposition for energy storage from a variety of stakeholder perspectives.

Looking Forward

The Center is currently working with stakeholders to determine the best strategy for moving forward. Ideas include hosting a second conference, hosting a series of smaller stakeholder meetings, developing technical analysis, and more.

PENNSYLVANIA AND THE CLEAN POWER PLAN

Christina Simeone, Project Lead

Issue Challenge

In June 2014, the U.S. Environmental Protection Agency (EPA) proposed the Clean Power Plan (CPP) rule, which aims to reduce carbon dioxide emissions by 30% (from 2005 levels) nationally by 2030. This proposed rule gives states significant flexibility to develop tailored compliance plans, but also creates a wide range of choices and tradeoffs that states must consider. The Center’s CPP policy project focuses on Pennsylvania’s approach to CPP compliance considerations.

Educating Stakeholders

On March 23, 2015, the Center hosted an invitation-only meeting, titled “Exploring Clean Power Plan Compliance Options for Pennsylvania.” The meeting brought together Pennsylvania CPP stakeholders, including but not limited to: traditional electric power generation interests, renewable energy and energy efficiency trade associations, energy and environmental regulators, industrial users of energy, labor unions, environmental advocates, business and industry associations, and others. The event featured presentations from Pennsylvania regulators and experts from around the country discussing innovative CPP compliance options, strategies other states are considering, and regulatory considerations that compliance plans must address. The Center published a proceeding report (goo.gl/SxPglz) capturing expert ideas and stakeholder input, available on the Center’s website.

Technical Assistance

The Center’s Christina Simeone is included as a supporting stakeholder in the Commonwealth of Pennsylvania’s Policy Academy grant from the National Governor’s Association (NGA). The grant program is providing four states with technical assistance and modeling capacity to help navigate CPP compliance decisions. Ms. Simeone is one of only three other non-regulatory Pennsylvania entities participating as an advisor in the NGA process.

Looking forward

The Center will continue to support the NGA process and focus on Pennsylvania’s compliance options. The Center will review

the final rule, when available, and work with stakeholders and the Commonwealth to determine how to add value to the discussion. The Center is also exploring the option of serving as a host for a Commonwealth-led public listening session in the fall of 2015.

KLEINMAN SPOTLIGHTS

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The Kleinman Center is
powered by people.

This year the Center supported student
innovation, faculty research, and academic
collaborations that brought together
researchers and learners from Penn's
campus and beyond.



STUDENT SPOTLIGHT

***PENN SUSTAINABILITY REVIEW* +
WHARTON UNDERGRADUATE ENERGY GROUP
TEAM UP FOR BIG IMPACT**

THE AIM OF *PENN SUSTAINABILITY REVIEW (PSR)* IS BOTH SIMPLE AND LOFTY: TO CREATE A PLATFORM TO EXCHANGE KNOWLEDGE, IDEAS, AND PERSPECTIVES ON SUSTAINABILITY.

With student writers from the across campus majoring in subjects as diverse as physics and finance, the magazine offers readers varied opinions and research in well-written prose.

In April 2015, *PSR* published its 6th edition. While previous editions focused on issues broadly related to sustainability, the student-run publication organized their Spring 2015 issue around a specific theme: energy policy. Sasha Klebnikov is a rising senior in Mechanical Engineering and Applied Mechanics and the Editor-in-Chief of *PSR*. A self-proclaimed “recently converted addict to all things related to energy policy, nuclear energy, and the petrochemical industry,” Klebnikov helped make the connection between the Kleinman Center and *PSR* in the Spring. “It seemed like a great opportunity for *PSR* to delve deep into a really important issue. The Kleinman Center’s support and guidance made this edition possible.”

WHARTON UNDERGRADUATE ENERGY GROUP: BUSINESS STUDENTS VISIT DRILLING RIG, LEARN ABOUT NATURAL GAS INDUSTRY FIRST-HAND

While Klebnikov and the *PSR* team were busily preparing their publication, the Kleinman Center was also busy helping another student group on campus. The Wharton Undergraduate Energy Group (WUEG) had an idea: they wanted to provide their student-members the opportunity to visit a series of Marcellus Shale drilling and production sites to see the natural gas industry first-hand. Supported by the Kleinman Center, the Wharton Council, and the Penn Wharton Public Policy Initiative (PWPPI), the WUEG spent a full day in Waynesburg, PA with Vantage Energy, a Denver-based exploration and production company, on April 10, 2015. The students visited three natural gas production locations: a drilling rig, a flow-back operation, and a completed, producing pad. The day generated so much positive attention that upon returning home, the Wharton Council presented the WUEG with the Most Innovative Event of the Year award.

Jack Tyree, President of WUEG, called the trip “unbelievable.” He explained that it’s difficult to understand the scale and sophistication of the natural gas production process until you visit a fully functioning operation. His main take-away from the trip?

Experiential learning matters. “It’s a rare thing,” Tyree said, “to have an experience like this. Most students are focused on doing well on their next test. But one of our WUEG members told me this [trip] was the most compelling learning experience he had at Penn. As a group, we need to do more of this [experiential learning].” Looking to next year, Tyree hopes WUEG can hit the road again, this time to a solar site or a wind energy farm.

TEAMING UP, TO LEARN TOGETHER

By the middle of April, *PSR*’s print edition had hit the racks, and the WUEG members were back from their trip. Seeing the opportunity for collaboration, the Kleinman Center connected the students, planting the seed for what would come next: a cosponsored luncheon and speaker panel on the future of communications around energy policy.



Moderating the talk, Penn’s very own Evan Lerner shared his views as the Science News Officer of the University’s Communications Office. Drs. Andy Huemmler and John Vohs, both of the School of Engineering and Applied Science, participated as panelists. Their unique areas of specialty within energy policy and fuel cells, respectively, allowed them to speak informatively of the challenges of gaining public support for energy technologies. Michael Freeman of Emerald Energy Consulting shed light on simple methodologies of saving energy, including smarter air conditioners and refrigerators, pointing solar panels toward the west, and storing electricity in electric cars. Members from both groups as well as the larger Penn student community attended, paving the way for continued future collaboration.

Above: On a Kleinman-sponsored trip, students from the Wharton Undergraduate Energy Group visit Vantage Energy in Waynesburg, PA.

STUDENT-FACULTY SPOTLIGHT

ELENA ROHNER + DR. NATALYA VINOKUROVA

A NATIVE OF NEW YORK CITY’S UPPER WEST SIDE, ELENA ROHNER (C’18) SPENDS HER SUMMERS VACATIONING IN THE ADIRONDACKS. HER FAMILY’S CABIN, ON A SMALL ISLAND SIX MILES FROM THE TOWN OF LONG LAKE, NEW YORK, IS ACCESSIBLE ONLY BY BOAT.



Elena Rohner, Undergraduate student, School of Arts and Sciences

While there is neither WiFi nor electricity on the island, her father recently installed solar panels that power, among other luxuries, a few 12-watt light bulbs to replace the previous propane-powered lights.

The contrast of living in what Rohner describes as a “concrete palace” throughout the year and spending her summers in the remoteness of her family’s vacation home spurred her early interest in energy, environmental stewardship, and sustainability. When Rohner arrived on Penn’s campus for her freshman year in the fall of 2014, she was determined to pursue an academic curriculum that allowed her to explore these interests. Her list of memorable classes is already lengthy, but Rohner says she was particularly inspired by Physics 016: Energy, Oil and Global Warming. “The class challenged the way that I thought,” Rohner reported. “I realized that decisions about energy go beyond appealing to [people’s] emotion and need to include realistic factors that have implications for policy, such as whether people will pay the extra amount of money it costs to buy electricity produced from [solar] panels versus natural gas.”

This summer, Rohner is working with Wharton’s Professor Natalya Vinokurova on a Penn Undergraduate Research Mentorship (PURM) grant sponsored by the Kleinman Center and organized by the Center for Undergraduate Research and Fellowships (CURF). Rohner and her fellow student Joshulyne Park are investigating BP’s safety culture, paging through hundreds of OSHA investigation reports and citations to build a database of information, which they will then analyze to better understand trends in BP’s safety record.

Rohner says that while her summer experience has helped her understand the way that regulators work, she is most excited to have concrete research experience. She thanks the Kleinman Center and CURF for providing meaningful opportunities for undergraduates outside of the classroom: “No one teaches you this in a course, how to really do [research].”

Rohner plans to declare a double major in Urban Studies and Environmental Studies during the Fall 2015 semester. After that, she’s keeping her options open. Not surprisingly, Rohner says she could see herself being a Park Ranger or an Urban Planner, either conserving open space or designing more sustainable cities.

FACULTY SPOTLIGHT

DR. ARTHUR VAN BENTHEM

IN ITS INAUGURAL YEAR, THE KLEINMAN CENTER SOUGHT TO ENGAGE FACULTY FROM ACROSS THE UNIVERSITY TO DEVELOP AN INTERDISCIPLINARY GROUP OF RESEARCHERS WHO SHARE AN INTEREST IN ENERGY POLICY.

Wharton Assistant Professor of Business and Public Policy Arthur van Benthem was an early and enthusiastic friend of the Center.

The collaboration began when the Center funded five guest lecturers for van Benthem’s spring MBA course, BEPP763: Energy Markets & Policy. The class, which was described by one student as giving “a great exposure to key energy issues and methods of market analysis,” provides an economist’s perspective on a broad range of topics that professionals in the energy industry will encounter. The considerable list of focus areas on the syllabus range from an overview of energy markets and the effects of deregulation, extraction, pricing, and investment risk in the oil and gas sectors to the economics of renewable energy. Guest lecturers included David Crane, CEO of NRG, and Albert Luu, VP of Structured Finance for SolarCity. The Kleinman Center also organized programming, panels, and lunches around their visits to engage the broader Penn community.

This year, the Kleinman Center’s collaboration with van Benthem extended beyond the classroom. His research addresses issues concerning solar policies, energy challenges in developing countries, and energy efficiency policies and regulations in the transportation/vehicle sector. In recent years, van Benthem has published several articles and was featured in numerous multimedia outlets to discuss fuel economy standards and fuel taxation, most recently in a piece co-authored by Mathias Reynaert for *The Economist*.

This spring, the Center awarded van Benthem and collaborators Dr. Sebastien Houde (Department of Agriculture and Resource Economics, University of Maryland) and Dr. Kenneth Gillingham (School of Forestry & Environmental Studies, Yale University) a research grant to study the economics of mile per gallon (MPG) claims. The project, currently underway, aims to investigate how advertising influences the demand for vehicles of different fuel economies and the overall emissions profile of the car fleet. The findings will shed light on the role of advertising in meeting tightened fuel economy standards, which van Benthem and colleagues expect to summarize in policy digests published by the Center in 2015–2016.

Beyond the upcoming digests, the Center and van Benthem have other plans for the upcoming year, including a Kleinman-sponsored visiting scholar.



Arthur van Benthem is an Assistant Professor of Business and Public Policy at the Wharton School. He received his PhD in Economics from Stanford University, his master’s degree in Management Science & Engineering from Stanford, and an undergraduate degree from the University of Amsterdam. Prior to his graduate studies, he worked in various roles at Royal Dutch Shell and as a stock trader at IMC Trading in Amsterdam.

FOR MORE INFORMATION ON THIS PROJECT, SEE PAGE 17.

STUDENT-POLICY SPOTLIGHT

ELISE HARRINGTON, DR. CARY COGLIANESE + DR. CHRIS CARRIGAN

IN NOVEMBER 2014, THE ALBERTA ENERGY REGULATOR (AER) SELECTED THE PENN PROGRAM ON REGULATION (PPR) LED BY DR. CARY COGLIANESE AT PENN LAW TO EXPLORE REGULATORY EXCELLENCE AND THE CHARACTERISTICS OF A “BEST-IN-CLASS” REGULATOR.



Elise Harrington,
Research Assistant,
Kleinman Center for
Energy Policy

PhD student, School
of Design

Photo by Sameer
Khan / Penn
Program on
Regulation

As a part of the many papers and reports penned for this project, the Kleinman Center participated in expert dialogues held over the past year and assisted with one of the four research papers unpacking the “Regulatory Core.” Elise Harrington, the Center’s Research Assistant, served as co-author of this paper, which focused on regulatory instrument choice and enforcement, or more broadly, regulatory problem-solving.

Working with Dr. Christopher Carrigan from George Washington University’s Trachtenberg School of Public Policy and Public Administration, this project was an opportunity for Harrington to learn from experts in the field of regulatory policy and participate in a research effort that complements her interests and current coursework. With the guidance of Drs. Coglianese and Carrigan, this project was Harrington’s first foray into research for an academic publication, a big milestone for a new graduate student. For Harrington, “understanding the spectrum of regulatory design and enforcement is a critical step in developing the ability to assess how and why certain institutions make decisions. It is the basis for thinking about how to design policies that can achieve measurable outcomes.”

While the project with AER is wrapping up, Dr. Carrigan and Harrington will continue to mold the final paper into book chapters. Harrington said she could not have asked for better mentors throughout this process: “Both the literature on regulation and the job of regulators—who are constantly trying to understand and manage competing demands—is incredibly complex. Right off the bat, I really appreciated the opportunity to bounce ideas off Chris and make continual adjustments together.” Harrington plans to pursue a research career studying institutional decision-making with an emphasis on energy development and natural resource management.

“[The Kleinman Center] extends the collaboration among the University’s schools and research centers, and serves as a home base for visiting professors, industry leaders, and resident scholars, cross-school courses, research projects on energy policy, public lectures, and private roundtables, all aimed at a level of collaboration and policy creation that will be effective at shaping action and investment in energy initiatives.”

—MARILYN JORDAN TAYLOR
DEAN AND PALEY PROFESSOR OF PENNDESIGN

EVENTS + CENTER PUBLICATIONS



At the Kleinman Center,
we value engagement.

Through public lectures, panel discussions,
and faculty seminars we join professionals and
practitioners with Penn's academic community
for education, conversation, and debate.

Center staff, research assistants, and Penn
faculty comment on timely energy policy
issues in briefs, digests and proceeding
reports published digitally.

EVENTS


JANUARY 29, 2015

ILLUMINATIONS AND EXPOSITIONS:
REINVENTING THE AMERICAN CITY 1875–1915

Cosponsored by the Graduate Program in
Historic Preservation at PennDesign

SPEAKER

David E. Nye, Professor of American History, University of
Southern Denmark



FEBRUARY 3, 2015

RISKS AND REGULATORY CHALLENGES:
UNCONVENTIONAL GAS EXTRACTION



Cosponsored by the Penn Program on Regulation & the
Wharton Risk Management and Decision Processes Center

SPEAKERS

Bernard Goldstein, Emeritus Professor and Dean,
University of Pittsburgh Graduate School of Public Health

Mitchell Small, H. John Heinz Professor of Civil and
Environmental Engineering, Carnegie Mellon University

Hannah Wiseman, Attorneys' Title Professor, Florida State
University College of Law



FEBRUARY 16, 2015

ADVANCES IN REGIONAL ENERGY POLICY:
A QUARTER CENTURY OF PROGRESS IN NEW ENGLAND

SPEAKER

Dr. Jonathan Raab, Director, New England
Restructuring Roundtable


MARCH 4, 2015

BATTERY SCIENCE: THE CONFLUENCE OF
ELECTROCHEMISTRY AND MATERIALS SCIENCE

Cosponsored by the A.J. Drexel Institute
for Energy and the Environment

SPEAKER

Dr. Esther Takeuchi, SUNY Distinguished Professor,
Stony Brook University



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and the Environment

MARCH 19, 2015

CLIMATE CHANGE ADAPTATION IN COPENHAGEN

SPEAKER

Lykke Leonardsen, Head of Climate Change Unit,
City of Copenhagen

MARCH 25, 2015

HEALTHY URBAN INFRASTRUCTURE: THE FUTURE OF
GREEN BUILDING STANDARDS & ENERGY POLICY

Cosponsored by the Penn Institute for Urban Research

SPEAKERS

Elizabeth Beardsley, Senior Policy Council, USGBC

Alex Dews, Executive Director, DVGBC

Dr. William Braham, Professor of Architecture, University
of Pennsylvania School of Design

Dr. Erica Cochran, Assistant Professor and UDream
Coordinator, Carnegie Mellon University



MARCH 31, 2015


THE FUTURE OF U.S. ENERGY:
BUSINESS AND POLICY PERSPECTIVES

Cosponsored by the Penn Wharton Public Policy Initiative

SPEAKERS

David Crane, CEO of NRG Energy

Benjamin Nussdorf, Senior Regulatory Advisor, Office of
Fossil Energy, U.S. Department of Energy



APRIL 9, 2015

SOLARCITY: FINANCING STRATEGIES
AND POLICY CHALLENGES IN THE
SOLAR SECTOR

Cosponsored by the Wharton School

SPEAKER

Albert Luu, Vice President of Structured Finance, SolarCity



CENTER PUBLICATIONS



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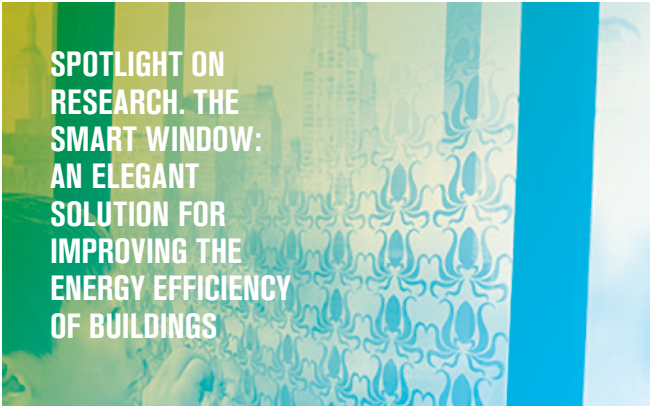
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“...galvanize all the University’s strengths and resources to advance the transformation of U.S. energy policy for a productive, secure and sustainable energy future.”

—AMY GUTMANN
PRESIDENT OF THE UNIVERSITY OF PENNSYLVANIA



“As a nation, we do not have a clearly articulated energy policy that promotes economic growth, energy optimization, and technological development, all in the context of a sensible environmental backdrop.”

—SCOTT KLEINMAN
C'94, W'94



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