



JULY 1, 2016-JUNE 30, 2017 | [kleinmanenergy.upenn.edu](http://kleinmanenergy.upenn.edu)

# Kleinman Center for Energy Policy

## 2016-2017 Annual Report

**Kleinman Center for Energy Policy**  
UNIVERSITY OF PENNSYLVANIA | SCHOOL OF DESIGN

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## FROM THE DIRECTOR

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It's been a productive year at the Kleinman Center for Energy Policy. It's also been a meaningful one, as we've made deeper connections with remarkable people and organizations across the globe.

### Research

In our third year, we expanded our research capacity with the addition of a faculty fellow, four senior fellows, a research fellow, and four research assistants. We supported faculty scholarship across campus and launched the Energy Economics and Finance Seminar, led by Faculty Fellow Arthur van Benthem, providing Penn's first monthly research seminar on energy policy.

We embarked on the second phase of our regional energy transition project—a major Center initiative that developed a new methodology to support the real-world energy policy decisions that challenge sub-national governments across the U.S. The Center also convened academics, industry, and regulators to discuss design options and develop a research agenda on subsidies in competitive electricity markets.

Meanwhile, Center staff and affiliated scholars continued to publish a wide array of research papers, policy digests, and blog posts.

### Programs

This year, we expanded our programs. In collaboration with 2016 Carnot Prize winner Dr. Fatih Birol, we launched the Kleinman Birol Fellowship at the International Energy Agency in Paris. Our first Kleinman Birol student fellow, Peter Sopher (M.B.A., Wharton), recently completed his summer work there.

### Reach

And, as you'll see when you turn the page, we expanded our reach. The Kleinman Center is on the map—from Pennsylvania to California; from Paris to Quito; from China to Africa. We are making meaningful connections on energy issues that cross many borders.

This reach also extends to the print and digital world. Over the past year, the Kleinman Center was referenced 63 times by 35 different news outlets. The media and our peer organizations are taking notice.

We look forward with enthusiasm to the upcoming year. Please join us at the Energy Forum for all our upcoming events—including the Carnot Prize Award Ceremony this fall.

Best,

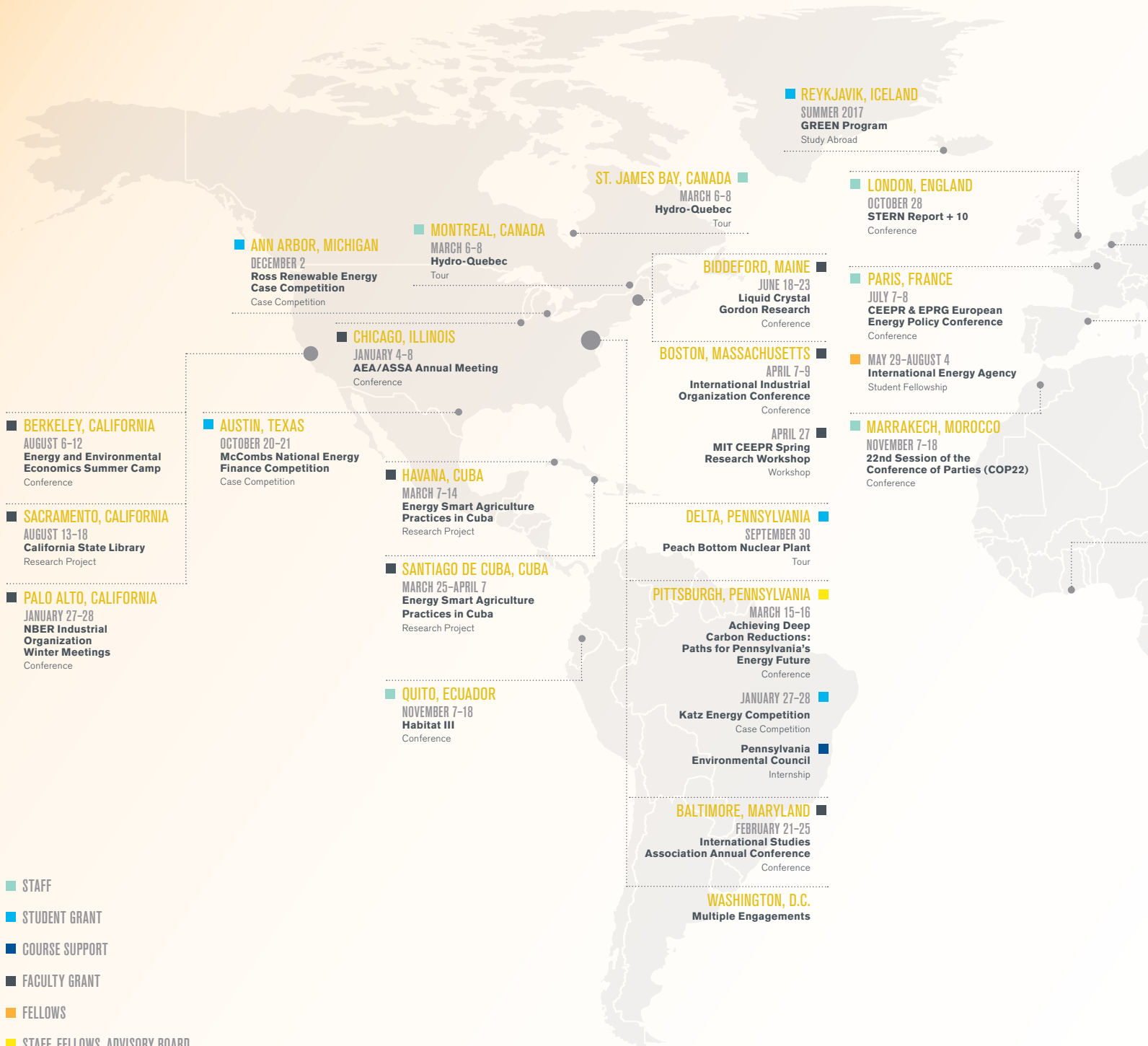


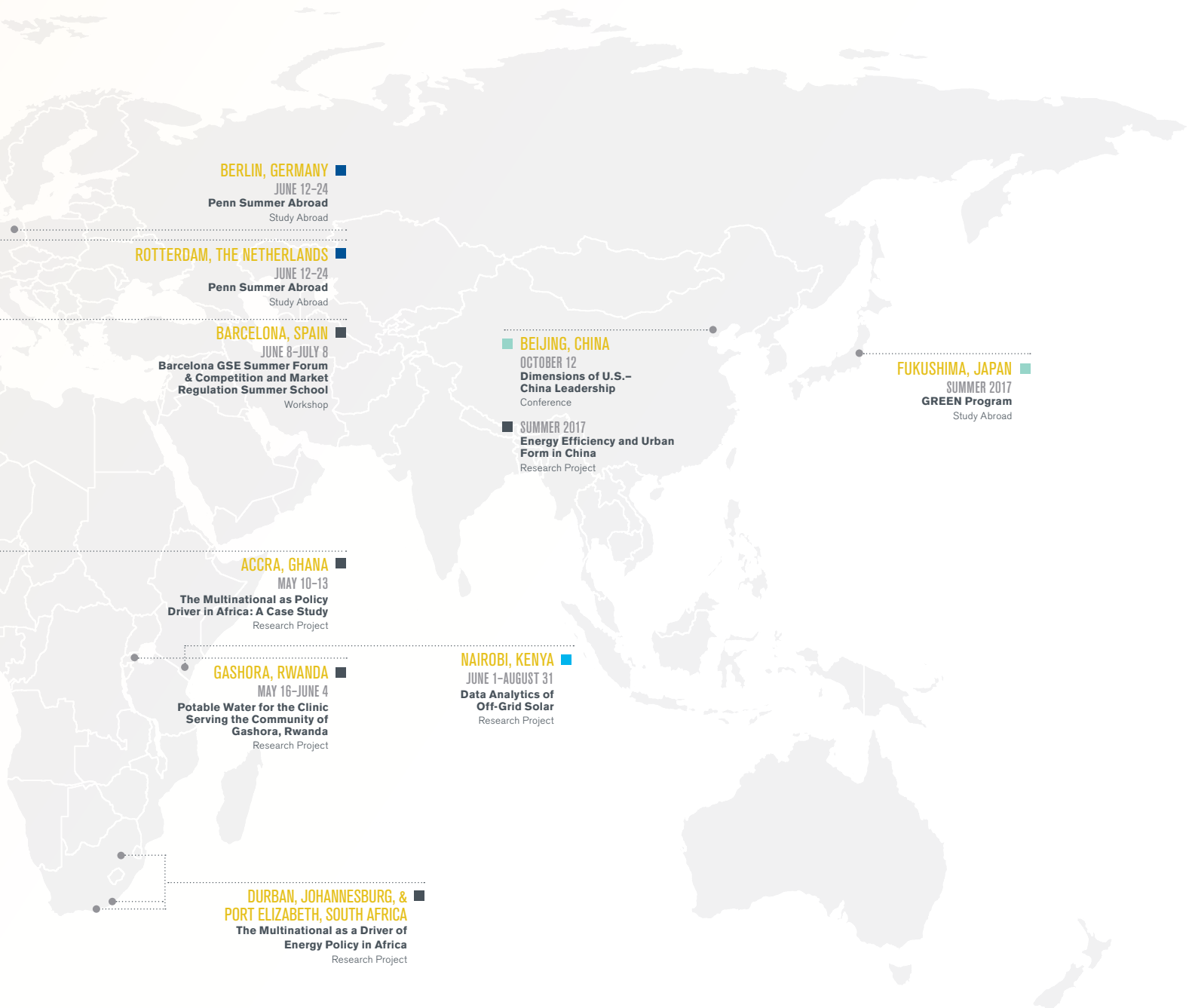
Mark Alan Hughes, Ph.D.  
*Founding Faculty Director, Kleinman Center for Energy Policy*  
*Professor of Practice, PennDesign*  
*University of Pennsylvania*



SPOTLIGHT

# KLEINMAN ON THE MAP





**BERLIN, GERMANY** ■  
JUNE 12-24  
Penn Summer Abroad  
Study Abroad

**ROTTERDAM, THE NETHERLANDS** ■  
JUNE 12-24  
Penn Summer Abroad  
Study Abroad

**BARCELONA, SPAIN** ■  
JUNE 8-JULY 8  
Barcelona GSE Summer Forum  
& Competition and Market  
Regulation Summer School  
Workshop

■ **BEIJING, CHINA**  
OCTOBER 12  
Dimensions of U.S.-  
China Leadership  
Conference

■ **SUMMER 2017**  
Energy Efficiency and Urban  
Form in China  
Research Project

■ **FUKUSHIMA, JAPAN**  
SUMMER 2017  
GREEN Program  
Study Abroad

■ **ACCRA, GHANA**  
MAY 10-13  
The Multinational as Policy  
Driver in Africa: A Case Study  
Research Project

■ **GASHORA, RWANDA**  
MAY 16-JUNE 4  
Potable Water for the Clinic  
Serving the Community of  
Gashora, Rwanda  
Research Project

■ **NAIROBI, KENYA**  
JUNE 1-AUGUST 31  
Data Analytics of  
Off-Grid Solar  
Research Project

■ **DURBAN, JOHANNESBURG, &  
PORT ELIZABETH, SOUTH AFRICA**  
The Multinational as a Driver of  
Energy Policy in Africa  
Research Project



SPOTLIGHT

## ENERGY POLICY NOW PODCAST

In January, the Kleinman Center launched *Energy Policy Now*, a podcast series that offers insights into the policy issues that define our relationship to energy and its impact on society and the environment.

Episodes feature conversations with Penn faculty and leaders from industry and government as they shed light on today's pressing energy policy debates. To date, *Energy Policy Now* has addressed issues including national climate policy, energy cybersecurity, and electricity restructuring, to name a few.

The series is produced and hosted by energy journalist Andy Stone and is available on the Kleinman Center website, as well as popular podcast platforms including iTunes.

FEBRUARY 28, 2017

### HOW U.S. LNG IS CHANGING THE GLOBAL NATURAL GAS MARKET

**Guest:** *Dr. Anna Mikulska, Senior Fellow, Kleinman Center for Energy Policy; Energy Studies Nonresident Scholar at Rice University's Baker Institute*

In 2016 the first shipments of U.S. LNG left from a terminal on the Gulf Coast, opening a new frontier of opportunity for the U.S. natural gas industry and, on an international scale, contributing to the development of a truly global gas market. This globalization is eroding traditional buyer-seller relationships, including those between the U.S. and its allies, with implications for political balance.

In this episode we explore the geopolitical implications of a global natural gas market, and potential impacts on U.S. foreign relations and policy.



MAY 30, 2017

### THE ECONOMICS OF CLIMATE CHANGE

**Guest:** *Dr. Per Krusell, Visiting Scholar, Department of Economics, University of Pennsylvania; Professor of Economics, Stockholm University*

Two issues repeatedly stymie efforts to aggressively address the challenge of climate change. The issues, how much it will cost to curb warming and prepare for its effects, and who will bear these costs, frequently play out in the political arena, where divisions form between expected economic climate winners and losers.

In this episode, we shed light on the economic costs of climate change, and offer insights into policies that might help manage these costs.



## MORE EPISODES

### CLIMATE CHANGE AND THE FUTURE OF RISK

*Dr. Howard Kunreuther, James G. Dinan Professor of Decision Sciences and Public Policy Operations, Information and Decisions Department, Wharton School*

### CARBON CAPTURE'S CLEAN COAL AMBITION

*John Quigley, Senior Fellow, Kleinman Center for Energy Policy; former secretary of Pennsylvania's Department of Environmental Protection and Department of Conservation and Natural Resources*

### FOSSIL FUEL SUBSIDIES: SHOULD THEY STAY OR SHOULD THEY GO?

*Dr. Gilbert Metcalf, Visiting Scholar, Kleinman Center for Energy Policy; Professor of Economics, Tufts University*

### WITHOUT THE U.S., DOES PARIS CLIMATE DEAL COLLAPSE?

*Dr. Andrew Light, Distinguished Senior Fellow, WRI; Director, Institute for Philosophy and Public Policy, George Mason University*

### THE MANY FRONTS OF TRUMP'S ENVIRONMENTAL DEREGULATION EFFORT

*Dr. Cary Coglianese, Director, Penn Program on Regulation; Founder, The Regulatory Review; Edward B. Shils Professor of Law; Professor of Political Science, University of Pennsylvania*

### DISTRIBUTED ENERGY: UTILITIES' EXISTENTIAL CHALLENGE?

*Sonny Popowsky, Kleinman Center Advisory Board member; former Consumer Advocate of Pennsylvania*

### CLEARING THE AIR: CARBON TAX OR CAP AND TRADE?

*Dr. James R. Hines, Jr., L. Hart Wright Collegiate Professor of Law and Co-Director of the Law and Economics Program, Michigan Law; Richard A. Musgrave Collegiate Professor of Economics, School of Economics; and Research Director of the Office of Tax Policy Research, Stephen M. Ross School of Business (University of Michigan)*

### HOW ALBERTA OVERCAME DISCORD TO ENACT CARBON TAX

*Gitane De Silva, Province of Alberta's Senior Representative to the United States*

### ADVANCING ENERGY STORAGE

*Ken Kulak, Senior Fellow, Kleinman Center for Energy Policy; Partner at Morgan, Lewis & Bockius*

### THE AIRLINE INDUSTRY EYES ITS CARBON FOOTPRINT

*Dr. Megan Ryerson, Assistant Professor of City and Regional Planning and Electrical and Systems Engineering, University of Pennsylvania*

### THE ENERGY SECTOR CONFRONTS CYBER RISK

*William Hederman, Senior Fellow, Kleinman Center for Energy Policy; former Senior Advisor to U.S. Secretary of Energy*

### WALKING THE TIGHTROPE: ENERGY DEVELOPMENT AND THE ENVIRONMENT

*John Quigley, Senior Fellow, Kleinman Center for Energy Policy; former Secretary of Pennsylvania's Department of Environmental Protection and Department of Conservation and Natural Resources*

### 20 YEARS OF ELECTRICITY RESTRUCTURING IN PENNSYLVANIA

*John Hanger, former Pennsylvania Secretary of Planning and Policy & Christina Simeone, Director of Policy and External Affairs, Kleinman Center for Energy Policy*



### ANDY STONE IS PRODUCER AND HOST OF ENERGY POLICY NOW.

Andy is a former senior reporter at *Forbes Magazine*, where he began covering the energy industry more than a decade ago. Prior to joining the Kleinman Center, Andy ran an executive meeting series on energy investment in New York and worked on corporate planning issues at PJM Interconnection.

📺 **SUBSCRIBE TO OUR PODCASTS OR LISTEN TO AN EPISODE ONLINE. VISIT:**  
[KLEINMANENERGY.UPENN.EDU/ENERGY-POLICY-NOW](http://kleinmanenergy.upenn.edu/energy-policy-now)



SPOTLIGHT

## SECOND ANNUAL CARNOT PRIZE

Named in memory of French scientist Sadi Carnot, our annual prize recognizes revolutionary contributions to energy policy through scholarship or practice.

This year, we awarded our second annual Carnot Prize to Dr. Fatih Birol, executive director of the International Energy Agency (IEA). Birol received this prize for his distinguished contributions to energy policy a day after the release of IEA's *World Energy Outlook*, the leading source of energy market analysis and projections.

At the award ceremony, Penn President Dr. Amy Gutmann announced a new graduate student fellowship program at IEA headquarters in Paris, named in honor of Birol, which will provide opportunities for a rising generation of Penn-educated leaders.

U.S. Secretary of Energy Ernest Moniz gave personal remarks praising Birol in a recorded video presentation. Birol then gave a policy lecture on his transformative vision of the IEA as a global body leading complex energy transitions, and shared his understanding of and commitment to the challenges of inclusion and equity.

In addition to the award ceremony, Birol also directed a morning briefing session at the Kleinman Center with students, faculty, and journalists—sharing highlights and insights from this year's *World Energy Outlook*. He was also the featured guest on *Knowledge@Wharton*, a live call-in show on Sirius Radio.

Birol announced that his \$25,000 in prize money will go toward IEA's work with the Clean Energy Ministerial (CEM), a high-level global forum that works to advance clean energy. Specifically, IEA will help support CEM's Women in Clean Energy initiative.

“Dr. Birol is steadily advancing inclusivity and equity by expanding the IEA’s role beyond primarily ‘first-world’ interests to encompass a much broader global community.”

—DR. AMY GUTMANN  
UNIVERSITY OF PENNSYLVANIA PRESIDENT





**FATIH BIROL**

Executive Director,  
International Energy Agency;  
Chairman, World Economic  
Forum (Davos) Energy  
Advisory Board

**Experience**

Member, UN Secretary-  
General's High-Level Group  
on Sustainable Energy for All

Energy Business Council  
Founder and Chair, IEA

Chief Economist and Director of  
Global Energy Economics, IEA

Oil Market Analyst, Organization  
of the Petroleum Exporting  
Countries (OPEC)

**Education**

B.S., Power Engineering,  
Technical University of Istanbul

M.S., Ph.D., Energy Economics,  
Technical University of Vienna

D.S. *honoris causa*,  
Imperial College London

**Other**

Named by *Forbes* as one of  
the most powerful influencers  
in the world energy scene

Made an honorary life member  
of the Galatasaray Football Club

Above: Fatih Birol, Carnot Prize Winner

**WHO IS SADI CARNOT?**

In 1824, French scientist Sadi Carnot published *Reflections on the Motive Power of Fire*, which is now recognized as the first statement of what is now known as the second law of thermodynamics.

Carnot recognized that the power of the steam engine would "produce a great revolution" in human development. The Carnot Prize honors those leading revolutions in energy policy to further progress and prosperity.



Above: Dr. Birol addresses his audience and shares his transformative vision for the IEA.

Bottom Left: Penn President Dr. Amy Gutmann announces the new Kleinman-Birol summer fellowship.

Bottom Right: Dr. Birol responds to questions on the *Knowledge@Wharton* radio show.



An aerial photograph of a vast solar farm in a desert. The solar panels are arranged in neat, rectangular rows that stretch across the arid, sandy terrain. A light-colored, winding road or path cuts through the landscape, separating different sections of the solar array. The overall scene is bathed in a warm, golden light, suggesting a late afternoon or early morning setting. The image is split vertically, with the left side having a green tint and the right side having a yellowish tint.

## RESEARCH



Our research agenda includes projects led by the Center as well as faculty scholarship supported by our annual grants program—all with an eye on energy policy.



SPOTLIGHT

## COMPARATIVE PATHWAYS TO REGIONAL ENERGY TRANSITION

The Kleinman Center continues our research to better understand energy policy making at the local and regional level. The “Pathways” project employs an approach to local energy policy research that the Center has pioneered in a number of recent essays and presentations; the approach identifies local net benefits as a critical metric in the impact of local energy and climate policy.

Building on our longstanding relationships with key partners in the Philadelphia region, and in partnership with ICF (a global consulting company), we have developed a project that we believe demonstrates a more sustainable approach to local policy development. We convened four teams of researchers, advisers, and stakeholders who have each developed their own strategic narrative and list of elements to describe a future energy strategy for the Philadelphia region. These four pathways were developed from the ground up with the goal of maximizing local net benefits, and each of the four is grounded in agendas and assets that are already recognized—and contested by some—in the region.

We have named the four pathways; Edge, Hub, Grid, and GasWorks. Each pathway makes different choices about how to maximize local net benefits.

**Hub:** *Build the infrastructure needed to transport natural gas from the Marcellus/Utica shale plays and leverage the resource to develop a petrochemical and manufacturing value chain in the region.*

**Edge:** *Invest and deploy a portfolio of distributed energy resources like rooftop solar, storage, and CHP to reduce peak electricity demand, local air pollution, and increase energy access, equity, and resilience.*

**Grid:** *Expand the electrification of transportation and other sectors to reduce local air pollution and decrease reliance on liquid fuels. Invest in efficiency and transmission to manage increased load from electrification.*

**GasWorks:** *Capitalize on Philadelphia’s ownership of the largest city gas utility in the country—expand natural gas delivery, district heating and cooling, and CHP systems; leverage ownership of the system to manage transition to sustainable energy.*

We are now in the first phase of quantifying the elements of each of these strategies, so that they can be assessed using a common methodology developed by ICF. That methodology links nine empirical models to estimate the local net benefits of policy pathways at the regional scale. The chain begins with the impacts of regional pathways on emissions, then on air quality, then on health, then on economic outputs including regional, state, and national gross product, employment, income, consumer prices, and fiscal impacts.

The goal of this exercise is to provide the region with four divergent but comparable paths forward for the Philadelphia region, providing policy makers with a tool for developing an energy strategy that is robustly responsive to the needs of both the city and of the planet.

SPOTLIGHT

# RECONCILING SUBSIDIZED RESOURCES IN PJM'S COMPETITIVE ELECTRICITY MARKETS

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On May 4, the Kleinman Center for Energy Policy organized a one-day workshop to discuss reconciling subsidized resources and competitive markets, as well as other market design issues that could have an impact on the performance of energy and capacity markets.

The focus of the discussion was PJM Interconnection (PJM) market design, but there were considerations of proposed solutions and practices in other jurisdictions.

The workshop was attended by 32 participants, including a group of academic economists, PJM market participants, PJM staff, PJM's market monitor, and FERC representatives. Our Center staff facilitated the sessions.

**Specific objectives for the day were:**

- *To gain a clear understanding of the different proposals to reconcile subsidized resources that have been explored to date for PJM markets.*
- *To discuss the benefits and drawbacks of these proposals, as well as other market design ideas and issues that could be considered in the short and long terms.*
- *To determine a research agenda necessary to inform market design policy decisions.*

Participants spent much time discussing challenges to capacity markets. They asserted that today there are converging forces being exerted on the market—such as low natural gas prices, renewable energy penetration, declining load growth, and other factors such as out-of-market interventions (i.e. subsidies).

During the workshop, participants covered a wide range of topics and viewpoints. These diverse viewpoints will be captured in a proceedings report to be published and shared with interested stakeholders.

The report will not include attribution for specific viewpoints, as the workshop took place under Chatham House Rules.

# FACULTY RESEARCH

**IN ADDITION TO OUR CENTER RESEARCH, WE AWARD FACULTY GRANTS FOR ENERGY-RELATED SCHOLARSHIP. THIS YEAR, WE SUPPORTED NINE PROJECTS ACROSS FIVE DIFFERENT SCHOOLS.**

## **SEPARATE MARKETS FOR EXTERNALITIES: REGIONAL VERSUS STATE-BY-STATE IMPLEMENTATION OF THE CLEAN POWER PLAN**

**Author:** *Dr. Jose Miguel Abito, Wharton*

In the United States, laws that are enacted at the federal level have to be implemented by individual states. But to what extent are separate markets good enough substitutes for a single market? This study empirically examines this question in the context of the Clean Power Plan.

## **ENERGY EFFICIENCY AND URBAN FORM IN CHINA**

**Author:** *Dr. Stefan Al, PennDesign*

While much attention on reducing carbon emission has been paid to alternative fuels and electric vehicles, better urban design is an important yet overlooked opportunity. This study investigates the Chinese policy implications of urban form in energy consumption, and informs and encourages policy makers to include energy performance standards in regulations for urban form.

## **HOW TO IMPROVE VEHICLE EMISSIONS POLICIES?**

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

Emissions standards for new vehicles are ubiquitous, but a substantial share of pollution is emitted by old vehicles with broken emissions control equipment. This project aims to measure how effective these existing policies are in reducing vehicle emissions, and predict which alternative policies could lead to more and cheaper emissions reductions.

## **PHILADELPHIA'S ENERGY TRANSITION**

**Author:** *Dr. William W. Braham, PennDesign*

**Co-author(s):** *Multiple (see project listing online)*

The way to reduce GHG emissions is the crux of virtually every energy policy debate in Philadelphia and around the world. Most actions to reduce global climate change depend on local and subnational governments. This multi-disciplinary project aims to estimate a regional GHG reduction rate based on specified local net benefits.

## **THE MULTINATIONAL AS POLICY DRIVER IN AFRICA: A CASE STUDY**

**Author:** *Dr. Sara Byala, School of Arts and Sciences*

Because of its franchise bottler model in Africa, Coca-Cola is deeply embedded in the community. And because of its size and sheer force as both an employer and a taxable entity, it carries enormous weight. This project explores how Coca-Cola directives are impacting the energy sector in Ghana.

## **POTABLE WATER FOR THE CLINIC SERVING THE COMMUNITY OF GASHORA, RWANDA**

**Author:** *Dr. Jorge J. Santiago-Aviles, School of Engineering and Applied Science*

In this project, and as part of their Senior Design Projects, Penn engineering students assisted the people of Gashora, Rwanda by designing and implementing an alternate water supply for the village clinic—pumping water through a solar energy system driven from the nearest lake (Lake Rumira) to the clinic.



Satellite image of Cuba where Dr. Shana M. Starobin is researching policy lessons on innovation in "energy smart" agriculture.

### **INNOVATING IN ISOLATION: CUBA'S LESSONS FOR SUSTAINABLE, 'ENERGY SMART' AGRICULTURE**

**Author:** *Dr. Shana M. Starobin, PennLaw*

Cut off for decades from trade with the rest of the world—especially after the collapse of its key trading partner, the former Soviet Union—Cuba was compelled, by necessity, to innovate. The purpose of this proposed research is to discern policy lessons on innovation in "energy smart" agriculture in Cuba.

### **WATER RIGHTS, DROUGHTS AND CLIMATE CHANGE ON THE FUTURE OF THE AMERICAN SOUTHWEST**

**Author:** *Hongyu Xiao, Ph.D. Candidate, Wharton*

Over the past decade, there is a notable impact of sustained drought on urban growth, economic activity, and energy usage patterns in the American Southwest. Using the changes brought by the interaction of water right seniority and drought conditions, this project explores the impact of water availability on cities and towns in California.

### **HUMIDITY RESPONSIVE, WATER HARVESTING AND SELF-COOLING BUILDING ENVELOPES**

**Author:** *Dr. Shu Yang, School of Engineering and Applied Science*

Windows have barely begun to tap the potential of sophisticated control and response strategies. And the demand for water in the last century has grown at twice the rate of the population. This project will develop a concept of creating humidity responsive, self-cooling building envelopes that provide fresh water and reduce building electricity usage for heating and cooling.

SPOTLIGHT

## ENERGY SMART AGRICULTURE IN CUBA

DR. SHANA M. STAROBIN



**DR. SHANA M. STAROBIN**

**Ph.D.**

Duke University, 2016

**M.E.M. (Environmental Management)**

Duke University, 2008

**M.P.P. (Public Policy)**

Duke University, 2008

**A.B.**

Harvard College, 2000

Dr. Shana M. Starobin, a second-year post-doctoral fellow with the Penn Program on Regulation at the Law School, received grant funding from the Kleinman Center to research “energy smart” agriculture in Cuba as a source of policy lessons on innovation.

Cut off for decades from trade with the rest of the world—especially after the collapse of its key trading partner, the former Soviet Union—Cuba and its farmers “were compelled to innovate in isolation and find their own ways to food security,” Starobin says.

The country devised low cost, low-to-no input alternatives for producing energy and sustaining agricultural productivity absent the fertilizers, petro-chemicals, and heavy machinery previously relied upon for the large-scale, industrial production of food and export commodities like sugar.

Starobin’s ongoing research project seeks to observe and describe current norms, institutions, practices, and technologies in use in Cuba’s agricultural sector. The project was undertaken in conjunction with undergraduate philosophy major Alexandra Johnson (also funded on a 2016–2017 Kleinman Center student research grant), who traveled to Cuba in March, and independent researchers Anna Levy and Rachel Gordon.

“[Cuba] has already been forced to rethink how to feed its population without a lot of external inputs, offering potential lessons to countries and communities anticipating resource scarcity,” says Starobin.

[Learn more about Dr. Starobin’s findings in her upcoming Policy Digest.](#)

“[Cuba] has already been forced to rethink how to feed its population without a lot of external inputs, offering potential lessons to countries and communities anticipating resource scarcity.”

—DR. SHANA M. STAROBIN  
FELLOW, PENN PROGRAM ON REGULATION, PENNLAW



SPOTLIGHT

# ENERGY ECONOMICS AND FINANCE SEMINAR

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## DR. ARTHUR VAN BENTHEM

In 2017, the Kleinman Center supported the establishment of the Energy Economics and Finance (EEF) seminar, organized by Faculty Fellow Dr. Arthur van Benthem.

The EEF seminar is a one-hour academic seminar series featuring presentations on energy-related research by faculty, graduate students, research fellows, and other experts such as visiting scholars.

Hosted by the Center, the seminar focuses on energy regulation and policy papers, including environmental and transportation topics with an energy focus. Seminar presenters share their completed work or work-in-progress to educate, gather peer feedback, and refine work products.

This seminar series commenced in Spring 2017 and featured the following research topics:

**MARCH 15, 2017**

### **The Surprising Pass-Through of Solar Subsidies**

*Presenter: Dr. Arthur van Benthem, Professor of Business Economics and Public Policy, Wharton*

**MARCH 29, 2017**

### **Voter Preferences and Political Change: Evidence From the Political Economy of Shale Booms**

*Presenter: Dr. Erik Gilje, Assistant Professor of Finance, Wharton*

**APRIL 12, 2017**

### **The Impact of Removing Tax Preferences for U.S. Oil and Gas Production**

*Presenter: Dr. Gilbert Metcalf, Visiting Scholar, Kleinman Center for Energy Policy; Professor of Economics, Tufts University*

**APRIL 26, 2017**

### **The Impact of Deregulation on Input Costs: Revisiting the Case of the U.S. Electricity Market**

*Presenter: Jin Soo Han, Ph.D. Student, Applied Economics, Wharton*




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**DR. ARTHUR VAN BENTHEM**

**Ph.D. (Economics)**

Stanford University, 2012

**M.S. (Management**

**Science & Engineering)**

Stanford University, 2005

**M.S. (Econometrics)**

University of Amsterdam,  
2003

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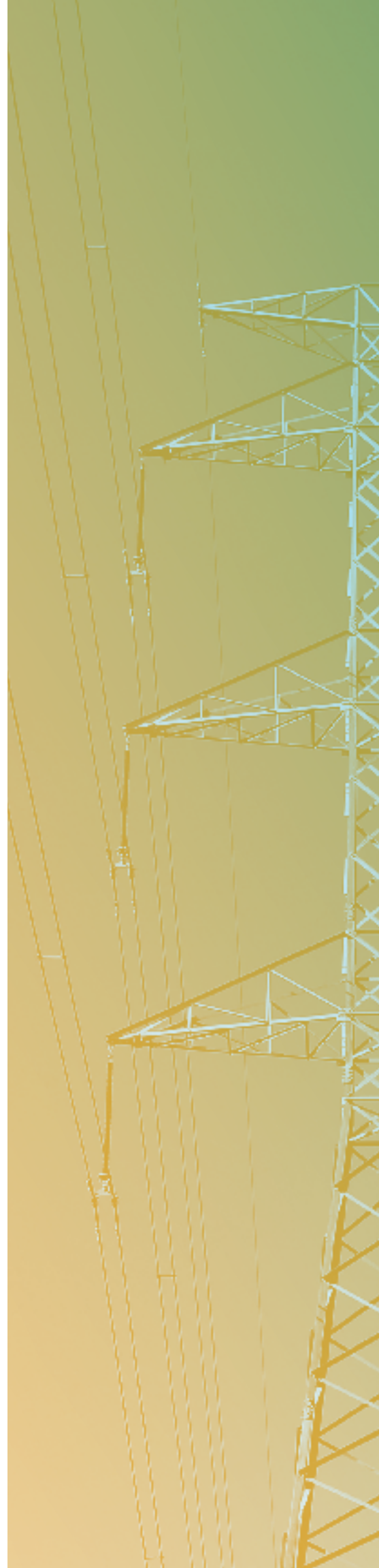
FOR MORE INFORMATION ON THE EEF SEMINAR AND A SCHEDULE OF UPCOMING PRESENTERS, VISIT:  
[BEPP.WHARTON.UPENN.EDU/RESEARCH/ENERGY-ECONOMICS-FINANCE-SEMINAR](http://BEPP.WHARTON.UPENN.EDU/RESEARCH/ENERGY-ECONOMICS-FINANCE-SEMINAR)



# PUBLICATIONS



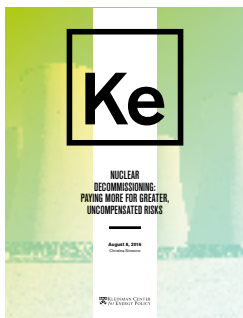
Research fuels our growing library of publications. Faculty, staff, students, senior fellows, and visiting scholars contribute to our collection of written work.





## PAPERS

The Kleinman Center published four applied research papers this year, gaining much attention from the media, government, and academia. Our papers not only make a splash; they build momentum.



AUGUST 8, 2016

### Nuclear Decommissioning: Paying More for Greater, Uncompensated Risks

*Christina Simeone, Director of Policy and External Affairs, Kleinman Center for Energy Policy*

As state policymakers consider strategies to keep economically struggling nuclear plants from premature retirement, they may be unaware of decommissioning realities—namely, the imposition of new costs and uncompensated risks that are accelerated upon plant retirement. This paper takes a closer look at the implications of nuclear decommissioning.

#### RESULTS

*Utility Dive*, *Electricity Policy Daily*, and *E&E News* were first to report on this research. NPR followed with a national, in-depth story on nuclear decommissioning. The paper led to a Kleinman Center grant supporting an ongoing research project between Wharton economist Dr. Jose Miguel Abito and the Kleinman Center to further investigate and quantify the uncompensated risks and costs of hosting spent fuel waste.



OCTOBER 28, 2016

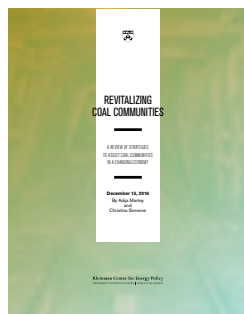
### A Case Study of Electricity Competition Results in Pennsylvania: Real Benefits and Important Choices Ahead

*Christina Simeone, Director of Policy and External Affairs, Kleinman Center for Energy Policy & John Hanger, former Pennsylvania Secretary of Planning and Policy*

The Pennsylvania Electricity Generation Customer Choice and Competition Act was passed in 1996, restructuring the state’s wholesale and retail electricity markets. Was the act a success? This paper provides a data-driven exploration of the market impacts of this major restructuring law—twenty years later.

#### RESULTS

This publication’s featured release at the Innovation, Challenge and Change conference was followed by extensive media coverage from national trade publications, academic journals, and the mainstream press. See more details in the adjacent spotlight.



DECEMBER 20, 2016

### Revitalizing Coal Communities: A Review of Strategies to Assist Coal Communities in a Changing Economy

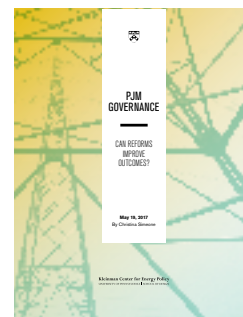
*Adija R. Manley, Research Fellow, Kleinman Center for Energy Policy & Christina Simeone, Director of Policy and External Affairs, Kleinman Center for Energy Policy*

The coal industry has been in a period of decline. In coal communities across the United States, miners are losing their jobs, governments are losing coal-tax revenues, and coal companies are filing for bankruptcy. This paper examines some of the initiatives underway in various

U.S. states to assist displaced coal miners and distressed coal communities.

#### RESULTS

Wharton’s Small Business Development Center partnered with the Kleinman Center on a “Partnerships for Opportunity and Workforce and Economic Revitalization” (POWER) grant from the U.S. Economic Development Administration to investigate ways the SBDC programs can help small businesses impacted by the downturn in Pennsylvania’s coal economy. This report presents an initial survey of contemporary approaches to addressing coal community challenges. The Center has since held stakeholder interviews and regional stakeholder meetings and is beginning to compile additional research on the topic in conjunction with the federal grant.



MAY 19, 2017

### PJM Governance: Can Reforms Improve Outcomes?

*Christina Simeone, Director of Policy and External Affairs, Kleinman Center for Energy Policy*

PJM Interconnection (PJM) enables dispatch and transmission of electric power to approximately 61 million people throughout 13 states and the District of Columbia. Much attention has been paid to the issues, decisions, and outcomes of PJM policy changes. Less attention has been paid to the process PJM uses to engage its stakeholders when proposing changes to market rules. This paper explores PJM governance and suggests ways to improve it.

#### RESULTS

*Utility Dive*, a leading industry publication, spotlighted the PJM Governance paper in a recent opinion post. PJM has invited the Center to present the report’s findings to its highest-level stakeholder committee. The Center will also be briefing FERC and PJM’s independent market monitor on the report.

READ EXECUTIVE SUMMARIES ONLINE, OR DOWNLOAD A PDF. VISIT: [KLEINMANENERGY.UPENN.EDU/PAPERS](http://KLEINMANENERGY.UPENN.EDU/PAPERS)

## SPOTLIGHT

## ELECTRICITY COMPETITION IN PENNSYLVANIA

Our Center's most requested publication this year, *A Case Study of Electricity Competition Results in Pennsylvania*, explores electricity competition twenty years after the state passed its consumer choice act.

In 1996, Pennsylvania passed the Electricity Generation Customer Choice and Competition Act, which restructured the state's wholesale and retail electricity markets. Policy makers did this in an effort to lower electricity costs through increased competition among electricity generators. In addition, the law enabled electricity consumers to shop for their own electricity providers and encouraged the development of new and innovative products.

Using a variety of metrics and available data to assess performance, authors Christina Simeone, Director of Policy and External Affairs at the Kleinman Center, and John Hanger, former Pennsylvania Secretary of Planning and Policy, found that under this act, Pennsylvanians do in fact pay less for their electricity and have more available supply options.

In 1996, the average retail price for electricity in Pennsylvania was 15 percent above the national average. Twenty years later, the price dropped to 0.1 percent below the national average.

These price drops were caused primarily by the increased use of cheap natural gas. However, Pennsylvania's competitive market structure enabled related savings to be passed along to consumers, Hanger said.


The report found industrial and commercial shopping customers experienced savings, though data indicated mixed outcomes for residential shopping customers. The report noted that residential default service customers would have experienced savings associated with wholesale market price decreases compared to inflation adjusted, pre-restructuring rates. Distribution rates were also tracked over time, showing how the regulated portion of a residential customer's bill has increased, potentially offsetting savings from wholesale generation cost reductions.

Simeone and Hanger presented these findings at the Innovation, Change, and Challenge conference last October in Hershey, Pennsylvania. The two-day conference focused on twenty years of electricity competition and consumer choice in Pennsylvania and gathered key market participants and policy makers.

The paper was formally referenced in legislative hearings by PJM Interconnection and the Pennsylvania Public Utility Commission, as well as several industry publications, academic journals, and mainstream media outlets.

## PUBLIC ATTENTION


## Government

[PJM Testimony before the Pennsylvania General Assembly's Joint House-Senate Nuclear Energy Caucus](#) 

[PA Public Utility Commission Chairman Brown's Testimony before the Pennsylvania House \(and Senate\) Appropriations Committee](#) 

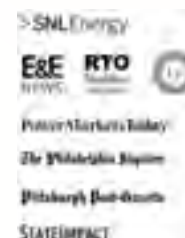
[PA Joint \(House and Senate\) Legislative Conservation Committee Newsletter](#) 

## Academia

[Urban Publications Cleveland State, College of Urban Affairs Electricity Customer Choice in Ohio: How Competition Has Outperformed Traditional Monopoly Regulation](#) 

[Utah Law Review SJ Quinney College of Law, University of Utah Free Trade in Electric Power](#) 

## Media



## POLICY DIGESTS

Our policy digests are designed to synthesize policy research into meaningful and manageable reads for experts and the public. This year, staff, faculty, students, senior fellows, and visiting scholars contributed to our growing library.



AUGUST 10, 2016

### Taxing the Tar Sands

Angela Pachon, Research Director, Kleinman Center for Energy Policy & Dillon Weber, Research Fellow, Kleinman Center for Energy Policy

Photo courtesy of Kris Krug, via Flickr



SEPTEMBER 10, 2016

### Lessons from Alberta: How to Implement a Carbon Tax

Angela Pachon, Research Director, Kleinman Center for Energy Policy & Dillon Weber, Research Fellow, Kleinman Center for Energy Policy



DECEMBER 6, 2016

### Managing Induced Seismicity from Wastewater Injection Wells in Pennsylvania

John Quigley, Senior Fellow, Kleinman Center for Energy Policy

Photo courtesy of Brennan Linsley, Associated Press



JANUARY 11, 2017

### Future Energy Demands on the Global Aviation Energy

Dr. Megan S. Ryerson, Faculty Grant Recipient, Kleinman Center for Energy Policy



FEBRUARY 3, 2017

### Aligning Local Logic with Global Need: A Path Towards Sturdier Mitigation Policy

Oscar Serpell, Research Associate, Kleinman Center for Energy Policy



FEBRUARY 27, 2017

### PG&E Battery Demonstration: Implications for the Energy Storage Value Stack

Thomas Lee, Research Assistant, Kleinman Center for Energy Policy



MARCH 15, 2017

### Stalled: Make Big Trucks More Fuel Efficient with Smarter Infrastructure Investment

Dr. Steve Viscelli, Senior Fellow, Kleinman Center for Energy Policy



MARCH 23, 2017

### Energy Market Shock Absorbers: Waiving Environmental Regulations in Response to Fuel Market Disruptions

Dr. Joseph E. Aldy, Visiting Scholar, Kleinman Center for Energy Policy; Associate Professor of Public Policy, John F. Kennedy School of Government, Harvard



MARCH 31, 2017

### Comparative Pathways to Regional Energy Transition

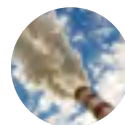
Dr. Mark Alan Hughes, Faculty Director, Kleinman Center for Energy Policy; Cornelia Colijn, Deputy Director, Kleinman Center for Energy Policy; Oscar Serpell, Research Fellow, Kleinman Center for Energy Policy



APRIL 27, 2017

### Ending Fossil Fuel Tax Subsidies: Removing Tax Preferences for Domestic Oil and Gas Production

Dr. Gilbert Metcalf, Visiting Scholar, Kleinman Center for Energy Policy



MAY 31, 2017

### The Carbon Tax: A Bargain for Conservatives

Dillon Weber, Research Fellow, Kleinman Center for Energy Policy



JUNE 23, 2017

### Why Some Nations Choose Nuclear Power

Dr. Katherine L. Smith, Visiting Scholar, Kleinman Center for Energy Policy & Dr. Reto Gieré, Professor and Chair of Earth and Environmental Science, University of Pennsylvania



JUNE 28, 2017

### Hot Topics on Climate Change

Dr. Roberto Schaeffer, Visiting Scholar, Kleinman Center for Energy Policy

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OR DOWNLOAD A PDF. VISIT:  
[KLEINMANENERGY.UPENN.EDU/POLICY-DIGESTS](http://KLEINMANENERGY.UPENN.EDU/POLICY-DIGESTS)

SPOTLIGHT  
**SCHOLARLY REVIEW**



Since 2016, Dr. James R. Hines, Jr. has served as the lead academic reviewer for the Kleinman Center's research and policy publications, which include all policy digests and papers.

Hines is a professor at Michigan Law, where he is the L. Hart Wright Collegiate Professor of Law and co-director of the Law and Economics Program. Also at the University of Michigan, he is the Richard A. Musgrave Collegiate Professor of Economics at the School of Economics and serves as Research Director of the Office of Tax Policy Research at the Stephen M. Ross School of Business.

He is a Research Associate with the National Bureau of Economic Research, Research Director of the International Tax Policy Forum, former co-editor of the *American Economic Association's Journal of Economic Perspectives*, and served as an economist in the U.S. Department of Commerce. He holds a B.A. and M.A. from Yale University and a Ph.D. from Harvard, all in economics.



Dr. James R. Hines, Jr.,  
Professor of Economics & Law,  
University of Michigan



Clearing the Air: Carbon Tax or Cap and Trade? Learn more about Dr. Hines in this *Energy Policy Now* podcast episode.

## BLOG POSTS

Our blog hosted more than 60 posts this year and covered a wide array of timely topics—from nuclear subsidies, to energy jobs, to cybersecurity. Blog contributors include faculty, visiting scholars, staff, and students. Here are some of this year’s highlights:

### WHAT WILL HAPPEN TO THE FIGHT TO SAVE THE CLIMATE UNDER PRESIDENT TRUMP? [↗](#)

By John Quigley

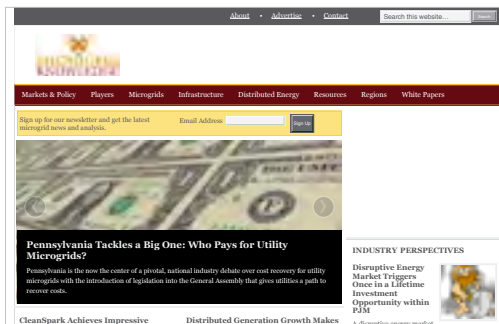
John Quigley was the keynote at this legal conference in Philadelphia.



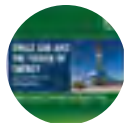
### ONCE IN A LIFETIME INVESTMENT OPPORTUNITY TO TRIGGER MORE BASELOAD RETIREMENTS IN PJM [↗](#)

By Christina Simeone

Microgrid Knowledge requested permission to republish this post. Utility Dive listed and linked to this post from “What We’re Reading.”



## MORE BLOG HIGHLIGHTS



### CAN FRACKING BE SUSTAINABLE [↗](#)

By John Quigley



### CYBER ATTACKS ON ENERGY INFRASTRUCTURE [↗](#)

By Christina Simeone  
Photo courtesy of Perspecsys Photos



### HOLD MR. SMITH'S HAND FIRMLY: THE NEED FOR THE CLEAN POWER PLAN [↗](#)

By John Quigley  
Photo courtesy of flazingo.com



### PATHWAYS TO A JUST ENERGY TRANSITION [↗](#)

By John Quigley  
Photo courtesy of stateimpact.org



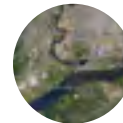
### PENNSYLVANIA HAS MORE JOBS IN CLEAN ENERGY THAN FOSSIL FUELS [↗](#)

By John Quigley



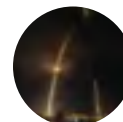
### POWERING PHILADELPHIA'S TRANSIT FUTURE [↗](#)

By Mollie Simon  
Photo courtesy of pennlive.com



### REDEVELOPING PHILLY'S NEIGHBORHOOD REFINERY [↗](#)

By Christina Simeone  
Photo courtesy of GoogleEarth



### SPACEX CAN BE A MODEL FOR ENERGY INDUSTRY [↗](#)

By William Hederman  
Photo courtesy of Ken Kremer



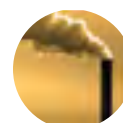
### TRANSPARENCY AND CAPPING RETURNS A MUST FOR NUCLEAR SUBSIDIES [↗](#)

By Christina Simeone  
Photo courtesy of geralt



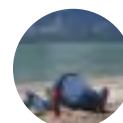
### TRUMP'S ENERGY ASPIRATIONS [↗](#)

By Christina Simeone  
Photo courtesy of Adam Moss



### WASHINGTON STATE TECHNOCRATS SPURN THE ALBERTA APPROACH [↗](#)

By Dillon Weber  
Photo courtesy of Niskansen Center



### WHY YOU SHOULD BE CONCERNED ABOUT DOE'S ELECTRICITY STUDY [↗](#)

By Christina Simeone  
Photo courtesy of Peter at flickr.com



## OUTSIDE PUBLICATIONS

### [CITIES CAN'T LEAD ON CLIMATE CHANGE MITIGATION](#)

By Dr. Mark Alan Hughes, Cory Colijn, & Oscar Serpell

*Bulletin of the Atomic Scientists* published this on February 28, 2017.



### [A NONPARTISAN APPROACH BEST FOR PROGRESS ON ENERGY POLICY](#)

By William Hederman

*The Philadelphia Inquirer* published this on March 20, 2017.



### [THERE IS NO ACCEPTABLE ALTERNATIVE TO PARIS](#)

By Dr. Mark Alan Hughes

*The Philadelphia Inquirer* published this on June 1, 2017.



Recognized by *Microgrid Knowledge, Utility Dive, The Philadelphia Inquirer* and more.

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[KLEINMANENERGY.UPENN.EDU/BLOG](http://KLEINMANENERGY.UPENN.EDU/BLOG)





## EVENTS



Our timely events draw in leading energy experts from industry, government, and other universities. Our Energy Forum is home to panels, lectures, screenings, and more.





FRIEDMAN CENTER FOR ENERGY POLICY  
STATE OF TEXAS  
NATURAL GAS

FRIEDMAN CENTER FOR ENERGY POLICY  
NATURAL GAS

FRIEDMAN CENTER FOR ENERGY POLICY  
NATURAL GAS

# EVENTS

This year, we continued to engage audiences with nearly two-dozen events. Leading experts presented cutting-edge insights from the energy world. Roundables in partnership with Jonathan Raab provided a forum to discuss critical issues on electricity and gas markets with industry thought leaders and regulators.

Lecture

**SEPTEMBER 27, 2016**  
**TRADEOFFS IN ADDRESSING FUEL SUPPLY SHOCKS**

**SPEAKER**

**Dr. Joseph E. Aldy**, *Visiting Scholar, Kleinman Center for Energy Policy; Associate Professor of Public Policy, John F. Kennedy School of Government, Harvard*

**Co-sponsors:** Penn Program on Regulation; Wharton Risk Management and Decision Processes Center

Lecture

**OCTOBER 25, 2016**  
**WHY DO SOME NATIONS CHOOSE NUCLEAR?  
AN OVERVIEW OF NUCLEAR POWER AROUND THE WORLD**

**SPEAKER**

**Dr. Katherine Smith**, *Visiting Scholar, Kleinman Center for Energy Policy*

**Co-sponsors:** Department of Earth and Environmental Science, School of Arts and Sciences

Roundtable

**SEPTEMBER 28, 2016**  
**FUTURE OF NUCLEAR POWER IN THE PJM FOOTPRINT  
AND VALUING DISTRIBUTED ENERGY RESOURCES**

**FACILITATOR**

**Dr. Jonathan Raab**, *President, Raab Associates, Ltd.*

Lecture

**NOVEMBER 2, 2016**  
**DEAN'S DISTINGUISHED SPEAKER SERIES: MACHARIA  
KAMAU, KENYAN AMBASSADOR TO THE UNITED NATIONS,  
AND SPECIAL ENVOY OF THE SECRETARY-GENERAL ON  
EL NIÑO AND CLIMATE**

**SPEAKER**

**Macharia Kamau**, *Kenyan Ambassador to the United Nations and Special Envoy of the Secretary-General*

**Co-sponsor:** PennLaw

Screening

**OCTOBER 10, 2016**  
**CHASING ICE: FILM SCREENING AND DIRECTOR Q&A**

**SPEAKER**

**Jeff Orlowski**, *Director, Chasing Ice*

**Co-sponsors:** Penn's Professional Master's in Earth & Environmental Science

Lecture

**NOVEMBER 7, 2016**  
**THE BUSINESS CASE FOR SUSTAINABLE HYDRAULIC FRACTURING**

**SPEAKER**

**John Quigley**, *Senior Fellow, Kleinman Center for Energy Policy; former Secretary of Pennsylvania's Department of Environmental Protection and Department of Conservation and Natural Resources*

Roundtable

**DECEMBER 1, 2016**  
**INTEGRATING PUBLIC POLICY RESOURCES INTO MARKETS;  
THE FUTURE OF TRANSMISSION**

**FACILITATOR**

**Dr. Jonathan Raab**, *President, Raab Associates, Ltd.*

Award Ceremony

**NOVEMBER 17, 2016**  
**2016 CARNOT PRIZE POLICY LECTURE AND  
AWARD CEREMONY**

**RECIPIENT & SPEAKER**

**Dr. Fatih Birol**, *Executive Director, International Energy Agency*

Panel

**DECEMBER 1, 2016**  
**CLIMATE AND ENERGY POLICY IN A TRUMP ADMINISTRATION:  
A NONPARTISAN PANEL DISCUSSION**

**PANELISTS**

**Michael Kulik**, *Lecturer, Earth and Environmental Sciences, Penn*

**Dr. Arthur van Benthem**, *Faculty Fellow, Kleinman Center for Energy Policy*

**Dr. Cary Coglianese**, *Professor and Director Penn Program on Regulation, PennLaw*

**MODERATOR**

**Christina Simeone**, *Director of Policy and External Affairs, Kleinman Center for Energy Policy*

**Co-sponsors:** Earth & Environmental Science Department; Penn Science Policy Group

Lecture

**NOVEMBER 21, 2016**  
**PRIORITIES FOR THE NEXT WAVE OF ENERGY INNOVATION**

**SPEAKER**

**Dr. Daniel L. Sanchez**, *Postdoctoral Research Scientist, Carnegie Institution for Science*

**Co-sponsor:** Mack Institute for Innovation Management

Panel

**JANUARY 24, 2017**  
**PRICING CARBON: LESSONS FROM CANADA**

**PANELISTS**

**Gitane De Silva**, *Alberta's Senior Representative to the United States, Canadian Embassy*

**Jon Mitchell**, *Vice President Environment and Sustainability, Cenovus*

**Dr. James R. Hines, Jr.**, *L. Hart Wright Collegiate Professor of Law and Co-Director of the Law and Economics Program, Michigan Law; Richard A. Musgrave Collegiate Professor of Economics, School of Economics; and Research Director of the Office of Tax Policy Research, Stephen M. Ross School of Business (University of Michigan)*

**Dr. Mark Alan Hughes**, *Faculty Director, Kleinman Center for Energy Policy*

Lecture

**FEBRUARY 28, 2017**  
**THE DAKOTA ACCESS PIPELINE: A REVIEW OF THE POLICY AND LEGAL ISSUES**

**SPEAKERS**

**Benjamin Nussdorf**, *Senior Regulatory Advisor, U.S. Department of Energy, Office of Oil and Gas Global Security and Supply*

**John Quigley**, *Senior Fellow, Kleinman Center for Energy Policy*

**Co-sponsor:** Penn Wharton Public Policy Initiative

Lecture

**FEBRUARY 2, 2017**  
**THE FUTURE OF ENERGY POLICY**

**SPEAKER**

**Dr. Steven Croley**, *Former General Counsel, U.S. Department of Energy*

**Co-sponsor:** Penn Program on Regulation

Lecture

**MARCH 15, 2017**  
**U.S. INTEREST IN MIDDLE EAST OIL: A CENTURY OF EXPERT FABULISM**

**SPEAKER**

**Dr. Roger Stern**, *Visiting Scholar, Kleinman Center for Energy Policy; Assistant Professor of Energy Economics, Policy, and Commerce, Collins College of Business, University of Tulsa*

Roundtable

**FEBRUARY 22, 2017**  
**THE PROMISE OF ENERGY STORAGE IN THE PJM FOOTPRINT**

**FACILITATOR**

**Dr. Jonathan Raab**, *President, Raab Associates, Ltd.*

Panel

**APRIL 4, 2017**  
**THE MOMENT TO GET CITIES RIGHT: INSIDE HABITAT III**

**PANELISTS**

**Dr. Mark Alan Hughes**, *Faculty Director, Kleinman Center for Energy Policy*

**Tom Dallesio**, *President, CEO, and Publisher, Next City*

**Dr. Ian Klaus**, *Perry World House Visiting Fellow, Former Senior Advisor for Global Cities, U.S. Department of State*

**Sarah Wu**, *Deputy Director, Office of Sustainability, City of Philadelphia*

**Co-sponsors:** Penn IUR; Perry World House; Next City

Lecture

**APRIL 5, 2017**  
**THE ROAD FROM THE PARIS CLIMATE AGREEMENT**

**SPEAKER**

**Dr. Andrew Light**, *Distinguished Senior Fellow, WRI; Director, Institute for Philosophy and Public Policy, George Mason University*

Stakeholder Meeting

**MAY 10, 2017**  
**GOAL ECONOMY STAKEHOLDERS OF EASTERN PENNSYLVANIA**

**PRESENTERS**

**DeShaun Bennett**, *Research Fellow, Kleinman Center for Energy Policy*

**Christina Simeone**, *Director of Policy and External Affairs, Kleinman Center for Energy Policy*

Lecture

**APRIL 12, 2017**  
**CLIMATE POLICY IN THE TRUMP ERA**

**SPEAKER**

**Dr. Gilbert Metcalf**, *Visiting Scholar, Kleinman Center for Energy Policy; Professor of Economics, Tufts University; Research Associate, National Bureau of Economics*

Stakeholder Meeting

**MAY 11, 2017**  
**GOAL ECONOMY STAKEHOLDERS OF WESTERN PENNSYLVANIA**

**PRESENTERS**

**DeShaun Bennett**, *Research Fellow, Kleinman Center for Energy Policy*

**Christina Simeone**, *Director of Policy and External Affairs, Kleinman Center for Energy Policy*

Lecture

**APRIL 19, 2017**  
**CLIMATE CHANGE AND ECONOMICS:  
A LUNCHTIME LECTURE WITH PER KRUSELL**

**SPEAKER**

**Dr. Per Krusell**, *Professor of Economics, Stockholm University*

**Co-sponsor:** Penn Fels Policy Research Initiative

Roundtable

**JUNE 2, 2017**  
**INTEGRATING STATE PUBLIC POLICY RESOURCES  
INTO MARKETS**

**FACILITATOR**

**Dr. Jonathan Raab**, *President, Raab Associates, Ltd.*

Workshop

**MAY 4, 2017**  
**INTEGRATING SUBSIDIZED RESOURCES INTO COMPETITIVE  
ELECTRICITY MARKETS**

**FACILITATORS**

**Christina Simeone**, *Director of Policy and External Affairs, Kleinman Center for Energy Policy*

**Angela Pachon**, *Research Director, Kleinman Center for Energy Policy*

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SPOTLIGHT

## PRICING CARBON: LESSONS FROM CANADA

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In June 2016, the government of the Canadian province of Alberta approved an ambitious new carbon tax, an unprecedented move for one of North America's top oil and gas producers. How did Alberta move from climate laggard to climate leader?

This past January, the Kleinman Center in partnership with the Canadian Consulate in New York held an event that explored Alberta's pathway to the new policy. The panel, co-hosted by Penn IUR, included representation from the Canadian embassy, industry, and academia.

During the panel, Gitane De Silva, Alberta's senior diplomatic representative to the United States, explained that, "It was critical that Alberta take action for our country to meet its Paris climate commitments."

Alberta's burden was particularly large, as it had just 11 percent of Canada's population, but was the source of 37 percent of the country's greenhouse emissions. The proposed solution was a carbon tax that would drive up the cost of transportation and heating fuels, in turn limiting energy demand. Alberta's plan would align with carbon reduction goals pushed by Canada's federal government, helping to ease competitiveness concerns even though Alberta's standards are more stringent than those pushed nationally.

Jon Mitchell, vice president of Environment and Sustainability at Cenovus, offered the industry perspective. Energy companies, he said, participated in the coalition building process and believed that technology could "solve some of the climate change challenges associated with what we do."

Dr. James R. Hines, Jr., Professor of Law at the University of Michigan, was also on the panel and provided an economic and legal perspective on Alberta's policy.

"The reality is that reducing greenhouse emissions and other pollutants is expensive," said Hines. "One way to mitigate those concerns is to rebate some of the additional tax revenue to the tax paying population."

The Albertans took such a route. De Silva explained that over the next five years the carbon tax will raise \$9.6 billion (CAD). The government will distribute a third of those revenues to households and small businesses, and use the balance of money to support coal communities, renewable energy development, and related projects.

"All the funds generated by the tax are kept in the province and reinvested in the province. More than 60 percent of Albertans will get a check from the government that offsets the cost of the levy," De Silva said.





Above: A full-house at Kleinman and Penn IUR joint event

Left: Jon Mitchell, Vice President, Environment and Sustainability, at Cenovus Energy

Center: Gitane De Silva, Alberta's Senior Representative to the United States

Right: Event panelists

“It was critical that Alberta take action for our country to meet its Paris climate commitments.”

—GITANE DE SILVA  
ALBERTA'S SENIOR REPRESENTATIVE TO THE UNITED STATES



# STUDENT GRANTS



From case competitions to mentored research, experiential learning is at the heart of our student grants program. We support students who go and do.





## STUDENT GRANTS

**IN YEAR THREE, THE KLEINMAN CENTER EXPANDED ITS OFFERINGS TO STUDENTS WITH A WIDE VARIETY OF STUDENT GRANTS—SUPPORTING TRAVEL, RESEARCH, INTERNSHIPS, FELLOWSHIPS, AND OTHER ENERGY-FOCUSED PROJECTS.**

### SUMMER INTERNSHIPS & FELLOWSHIPS

#### City of Philadelphia Energy Office

*Anya Gilroy, Environmental Studies, SAS*

#### Department of Energy Office of Electricity Delivery & Energy Reliability

*Aran Fox, Philosophy, Politics and Economics, SAS*

#### Heinrich Boll Foundation

*Gabriela Reiter, Environmental Studies, SAS*

**Co-sponsor:** Penn Wharton Public

Policy Initiative

#### International Energy Agency Fellow

*Peter Sopher, M.B.A., Wharton*

#### Keystone Energy Efficiency Alliance

*Julia Lesko, Economics and Environmental Science, SAS*

#### Pennsylvania Environmental Council

*Rachel Valetta, Ph.D., Earth and Environmental Science, SAS*

#### Philadelphia Energy Authority

*Mahvish Azim Ilyas, Environmental Studies, SAS*  
*Enrique Montoya, Environmental Studies, SAS*  
*Ejirooghene Ojeni, Environmental Studies, SAS*

#### World Bank Group: Multilateral Investment Guarantee Agency

*Kirtika Challa, Business Economics and Public Policy, Wharton*

*Junghoon (Robert) Kim, Finance, Wharton*

*Nayeon Lee, Business Analytics, Wharton*

**Co-sponsor:** Penn Wharton Public

Policy Initiative

### PENN UNDERGRADUATE RESEARCH MENTORING (PURM)

#### Environmental Histories of Architecture

*Amy Juang, Undeclared, SAS (with Daniel Barber, Architecture, PennDesign)*

#### High-Performance Nanoporous Alloy-Type Anodes Materials for Next Generation Energy Storage

*Christina Nordum, Materials Engineering, SEAS and William Spence, Engineering, SEAS (with Eric Detsi, Materials Science and Engineering, SEAS)*

#### Optimism About the Climate: A Double-Edged Sword?

*Olivia Podos, Undeclared, SAS (with Geoff Goodwin, Psychology, SAS)*



Anya Gilroy, an Environmental Studies student, tours Fairmount Organics Recycling as part of her internship with the Energy Office at the City of Philadelphia.

**CONFERENCES & COMPETITIONS****KATZ Energy Case Competition***Divye Goyal, M.B.A., Wharton**Jiken Patel, Mechanical Engineering and Applied Mechanics, SEAS**Craig Pulver, M.B.A., Wharton**Adithya Seshadri, Mechanical Engineering and Applied Mechanics, SEAS***McCombs Case Competition, Austin TX***Zachary Goldstein M.B.A., Wharton**Phillip Graham Gallagher M.B.A., Wharton**Upadhi Kabra, M.B.A., Wharton**Suhrid Mantravadi M.B.A., Wharton**Claire Tramm M.B.A., Wharton***PSR Business Sustainability Conference***Elliot Bernstein, Undecided, Wharton***Ross Renewable Energy Competition***Alexander Bolano, M.B.A., Wharton**Scott Huffman, M.B.A., Wharton**Sana Samnani, M.B.A., Wharton**Aroon Vijaykar, M.B.A., Wharton***RESEARCH PROJECTS****Data Analytics Off-Grid Solar in Nairobi, Kenya***Kennan Cronen, M.B.A., Wharton***"Energy Smart" Agriculture Practices in Cuba***Alexandra Johnson, Philosophy, SAS***Incentivizing Private Sector Finance of Renewable Energy Projects in Emerging Markets***Yann Manibog, M.B.A., Wharton***International Energy:****Upstream Data Analytics Project***Ross Lubetkin, M.B.A., Wharton***TRAVEL****Berlin and Rotterdam (Travel-Study Program)***Nathan Fisher, Mechanical**Jacob Kind, Undecided, SAS**Damien Koussis, Earth Science, SAS***Habitat III Travel: Children and Youth Representation Group***Mikaela Preston, Chemical and Biomolecular Engineering, SEAS***Trip to Peach Bottom Atomic****Power Station Wharton Energy Club****Student Lead:** *Olivia Chen, Operations**Information and Decisions, Wharton***GREEN PROGRAM**

The GREEN Program is an off-campus organization that helps support sustainable learning out of the classroom and around the globe. This year, the Kleinman Center worked with the GREEN Program to help fund travel study opportunities for Penn students in Iceland and Japan:

**Iceland***Uzair Akhtar, Mechanical Engineering, SEAS**Daniel Carrillo, Electrical Engineering, SEAS**Tabeen Hossain, Environmental Studies, SAS**Mary Zhuo Ke, Bioengineering, SEAS**Kaylyn Rocher, Mechanical Engineering**and Applied Mechanics, SEAS**Margarita Wegner, Environmental Studies**and Political Science, SAS***Japan***JingJing Zeng, Systems Engineering, SEAS*

"The Kleinman Center for Energy Policy Internship Program has been an incredible asset for the City of Philadelphia's Energy Office. The quality of the candidates allows us to maximize the number of tasks the students can complete while ensuring they get the most out of their time here. Each student has brought with them different talents and skillsets that have been a tremendous help to the work that we do."

**—ADAM AGALLOCO**

ENERGY MANAGER, CITY OF PHILADELPHIA



Student photos from Iceland, where six Penn students participated in the GREEN Program.

SPOTLIGHT

## IEA SUMMER FELLOWSHIP

### PETER SOPHER

This year, the Kleinman Center, in partnership with the International Energy Agency (IEA), established the Kleinman Birol Fellowship. Named after IEA Director and 2016 Carnot Prize winner Dr. Fatih Birol, this new summer fellowship brings a University of Pennsylvania graduate student to Paris for an in-depth summer work experience at the IEA.

Wharton student Peter Sopher was our inaugural Kleinman Birol fellow, who completed his fellowship in July. He spent the summer working within IEA's Economics and Investments Office, where he contributed to their publication, *World Energy Investment 2017*. Sopher dedicated most of his time, however, to an independent project analyzing whether the early stage venture capital model fits the energy sector.



Peter Sopher,  
Kleinman Birol Fellow


“At Wharton, I’m double majoring in finance and entrepreneurial management—so venture capital as a subject is at the intersection of those two areas,” Sopher explained. “This project really gets to the heart of everything that I’m studying and intend to study.”

When Sopher first heard about the Kleinman Birol fellowship last spring, he was immediately interested.

With five years of work experience at the Environmental Defense Fund as a Policy Analyst on the Clean Energy Team and as the Climate Economics Fellow on the International Team, Sopher was deeply invested in clean energy on a global level. As a master’s student at Wharton, he was also an active member of Wharton’s Energy Club and the energy group within Wharton’s Impact Investing Partners. In addition, Sopher had family ties to France.

“I saw this fellowship as a once-in-a-lifetime opportunity to work at an organization that I respected, while getting a more comprehensive view of energy and a more international experience,” said Sopher.

The Kleinman Birol fellowship is an annual summer fellowship open to all Penn graduate students. Following a successful inaugural year, the Kleinman Center will solicit applications again in late fall—for Summer 2018.



“I saw this fellowship as a once-in-a-lifetime opportunity to work at an organization that I respected, while getting a more comprehensive view of energy and a more international experience.”

—PETER SOPHER  
KLEINMAN BIROL FELLOW  
M.B.A. STUDENT, WHARTON






## COURSEWORK

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Penn students with an interest in energy policy can tap into our graduate-level courses. Some dive deeper with our certificate program.







# OVERVIEW

This year, we admitted a new group of students into our certificate program. Once again, we offered Introduction to Energy Policy, a foundation course that is open to all graduate students and advanced undergraduates seeking an introduction to the interdisciplinary basics of global energy policy formation.

## CERTIFICATE PROGRAM

Now in its second year, our Certificate in Energy Management and Policy helps students prepare for careers in the energy space. The program is open to professional graduate students interested in adding an understanding of energy policy to their list of educational qualifications. It leverages the interdisciplinary nature of energy policy education at Penn by drawing from a comprehensive set of courses across several schools.

### This Year's Certificate Recipients

- *Aubrey Jahelka, Masters of City Planning, PennDesign*
- *Ricardo Pena, Masters of Public Administration, School of Arts and Sciences*
- *Amanda Baker, Architecture, PennDesign*

“Energy is truly an interdisciplinary field, and the Kleinman program recognizes this. Being able to take a class on urban planning at PennDesign while then learning how to fund your proposals during an energy finance class at Wharton is appealing.”

—JONATHAN HESS  
J.D., PENNLAW

SPOTLIGHT

## INSIDE THE CLASSROOM

Penn students flocked into our Kleinman Center classroom last fall for a unique opportunity to learn from two leading experts from industry and academia.

Senior fellows William Hederman and Dr. Anna Mikulska co-taught Introduction to Energy Policy (ENMG 502). It was their second year teaching this course, and the third time it was offered by the Center.

Mikulska, a nonresident scholar in energy studies at Rice University's Baker Institute, enriched the classroom with her deep understanding of global energy markets.

Hederman, former Senior Advisor to the U.S. Secretary of Energy Dr. Ernest Moniz, offered students an in-the-trenches look at domestic and international energy policy with his perspectives from Washington, D.C.

The class examined how energy policy is made and applied across local, state, and federal levels of the U.S. government as well as abroad.

"The class' unique format includes students from variety of departments," said Mikulska. "This encourages cross-learning and incorporates multiple perspectives into in-class discussions and student participation."

Introduction to Energy Policy is a required course for graduate students enrolled in our certificate program. The class offers a broad view of energy policy issues from nuclear to fossil fuels to renewable energy. Special consideration is given to how issues of climate change and sustainability affect those policies and policy proposals. Students are encouraged to explore in more depth energy issues of particular interest in their class presentations and final policy papers.

Advanced undergraduates may also take the course, with prior approval.



Top: Dr. Anna Mikulska, Senior Fellow, Kleinman Center for Energy Policy

Bottom: Bill Hederman, Senior Fellow, Kleinman Center for Energy Policy

"This was an excellent course that gave me a solid foundation on national and international energy policy."

—STUDENT REVIEW



# PEOPLE

Talented people power our Center. We pool their deep and varied expertise to address a broad spectrum of energy policy issues.

## ADVISORY BOARD



**PAUL BONNEY**

Paul Bonney is Senior Vice President of Legal and Regulatory Strategy for Pepco Holdings at Exelon Corporation.



**MARVIN SCHLANGER**

Marvin Schlanger is Chairman of the Board and former CEO of CEVA Group, PLC.



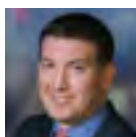
**MARK BROWNSTEIN**

Mark Brownstein is Vice President and Chief Counsel of the U.S. Climate and Energy Program at the Environmental Defense Fund.



**FREDERICK STEINER**

Dr. Frederick Steiner is Dean and Paley Professor of PennDesign at the University of Pennsylvania.



**SCOTT KLEINMAN**

Scott Kleinman is Lead Partner for Private Equity at Apollo and founder of the Kleinman Center for Energy Policy.



**LYNN SCARLETT**

Lynn Scarlett is Co-Chief of External Affairs and Global Managing Director for Public Policy at The Nature Conservancy.



**SONNY POPOWSKY**

Sonny Popowsky served for more than two decades as the Consumer Advocate of Pennsylvania.

## INCOMING MEMBER

 **FOR FULL ADVISORY BOARD BIOS, VISIT:**  
[KLEINMANENERGY.UPENN.EDU/ADVISORY-BOARD](http://KLEINMANENERGY.UPENN.EDU/ADVISORY-BOARD)

 **FOR FULL FELLOW BIOS, VISIT:**  
[KLEINMANENERGY.UPENN.EDU/FELLOWS](http://KLEINMANENERGY.UPENN.EDU/FELLOWS)

## FELLOWS

Our fellows contribute to the life of the Center by creating connections to policy-relevant, off-campus work. Each fellow designs a mutually beneficial portfolio of work that often involves teaching and lecturing, writing and thought leadership, and developing projects that help connect Penn's academic strengths with real-world issues.

### SENIOR FELLOWS



**WILLIAM HEDERMAN**

*Independent Senior Adviser, Deloitte & Touche, LLP*

William Hederman is Independent Senior Adviser at Deloitte and Touche, LLP and Executive Adviser at Agile PQ, Inc. He was recently Senior Advisor to Secretary Ernest Moniz at the U.S. Department of Energy.



**JOHN QUIGLEY**

*Principal, John H Quigley, LLC*

John Quigley is a consultant, former Secretary of Pennsylvania's Department of Environmental Protection, and former Secretary of the state's Department of Conservation and Natural Resources.

[POLICY DIGEST: MANAGING INDUCED SEISMICITY FROM WASTEWATER INJECTION WELLS IN PENNSYLVANIA](#)



**KENNETH KULAK**

*Partner, Morgan, Lewis & Bockius*

Ken Kulak is a partner at the law firm of Morgan Lewis, where he advises clients on energy regulation and complex energy transactions. His clients include utilities, developers, investors, and corporate energy users.



**STEVE VISCELLI**

*Lecturer, Department of Sociology*

Dr. Steve Viscelli is a lecturer in Penn's Department of Sociology. His research focuses on work, labor market economics, and economic regulation. He is currently working to improve fuel efficiency in the trucking industry.

[POLICY DIGEST: STALLED: MAKE BIG TRUCKS MORE FUEL EFFICIENT WITH SMARTER INFRASTRUCTURE INVESTMENT](#)



**ANNA MIKULSKA**

*Scholar, Rice University*

Dr. Anna Mikulska is a nonresident scholar in Energy Studies at Rice University's Baker Institute. Her research interests center around European energy markets and energy policy.

### FACULTY FELLOW



**HOWARD NEUKRUG**

*Principal, CASE Environmental, LLC*

Howard Neukrug is a national expert on water policy. He is Principal at CASE Environmental, LLC and an advisor to the U.S. Environmental Protection Agency and U.S. Forest Service, and former CEO of Philadelphia Water.



**ARTHUR VAN BENTHEM**

*Professor of Business Economics & Public Policy, Wharton*

Arthur van Benthem is Professor of Business Economics and Public Policy at Wharton. Before his doctoral studies, he worked as an energy economist at Royal Dutch Shell.

[SEMINAR SERIES: ENERGY ECONOMICS AND FINANCE](#)



# PEOPLE

## VISITING SCHOLARS

This year, we welcomed six visitors to Penn campus for collaborative weeklong residencies. During their visits, scholars gave public lectures and met with various faculty and research staff. We then published the results of this collaborative work as policy digests.

The nomination process for visiting scholars opens each spring semester. Visiting scholars are often nominated by Penn faculty who hope to establish new research projects or work on existing ones. This academic year, we invited national and international scholars in the fields of energy policy and energy technology:



### JOSEPH ALDY

*Nominated By: Penn Program on Regulation, PennLaw*

*Host: Cary Coglianese*

Dr. Joseph Aldy is Associate Professor of Public Policy at Harvard's John F. Kennedy School of Government. He is also Senior Adviser at the Center for Strategic and International Studies and Faculty Chair for the Regulatory Policy Program at the Mossavar-Rahmani Center for Business and Government.

[LECTURE: TRADEOFFS IN ADDRESSING FUEL SUPPLY SHOCKS](#)

[POLICY DIGEST: ENERGY MARKET SHOCK ABSORBERS](#)



### ROBERTO SCHAEFFER

*Invited & Hosted By: Kleinman Center for Energy Policy*

Dr. Roberto Schaeffer is Professor of Energy Economics in the Energy Planning Program (PPE) at the Federal University of Rio de Janeiro (UFRJ). He is also a member of Working Group III on the Intergovernmental Panel on Climate Change (IPCC), where he serves as leader of the Brazilian Country Team. He holds a Ph.D. from Penn's Energy Management and Policy Program.

[POLICY DIGEST: HOT TOPICS IN ENERGY POLICY](#)



### KATHERINE SMITH

*Nominated By: Earth & Environmental Science Department, School of Arts and Sciences*

*Host: Dr. Reto Gieré*

Dr. Katherine Smith is Senior Technology and Market Assessor at Gemaker. She is also a former scientific attaché to the Australian Government and a former Senior Advisor of International Relations at the Australian Nuclear Science and Technology Organisation.

[LECTURE: WHY DO SOME NATIONS CHOOSE NUCLEAR? AN OVERVIEW OF NUCLEAR POWER AROUND THE WORLD](#)

[POLICY DIGEST: WHY SOME NATIONS CHOOSE NUCLEAR POWER](#)



### ROGER STERN

*Nominated By: Department of Political Science, School of Arts and Sciences*

*Host: Dr. Rob Vitallis*

Dr. Roger Stern is Assistant Professor of Energy Economics, Policy, and Commerce at University of Tulsa's Collins College of Business. He has presented seminars to the Office of the Chief of Naval Operations; U.S. Department of State; and Council on Foreign Relations Nuclear Security Roundtable.

**LECTURE: U.S. INTEREST IN MIDDLE EAST OIL: A CENTURY OF EXPERT FABULISM**



### JÉRÔME TAILLARD

*Nominated By: Finance Department, Wharton*

*Host: Erik Gilje*

Dr. Jérôme Taillard is an Assistant Professor of Finance at Babson College in Massachusetts. His main research interests are in corporate finance, with a current focus in areas of risk management, innovation, litigation, corporate governance and the oil and gas industry. Prior to completing his Ph.D., Dr. Taillard served as consultant on risk management.



### GILBERT E. METCALF

*Invited & Hosted By: Kleinman Center for Energy Policy*

Dr. Gilbert Metcalf is a Professor of Economics at Tufts University. He also is a Research Associate at the National Bureau of Economic Research and the former Deputy Assistant Secretary for Environment and Energy at the U.S. Department of Treasury.

**LECTURE: CLIMATE POLICY IN THE ERA OF TRUMP**  
**POLICY DIGEST: ENDING FOSSIL FUEL SUBSIDIES**

**FOR FULL BIOS, VISIT:**  
[KLEINMANENERGY.UPENN.EDU/VISITING-SCHOLARS](http://kleinmanenergy.upenn.edu/visiting-scholars)

# PEOPLE

## STAFF

### WILLIAM COHEN

*Center Coordinator*

### CORNELIA COLIJN

*Deputy Director*

### MARK ALAN HUGHES, PH.D.

*Founding Faculty Director*

### ANGELA PACHON

*Research Director*

### OSCAR SERPELL

*Research Associate*

### CHRISTINA SIMEONE

*Director of Policy and External Affairs*

### MOLLIE SIMON

*Administrative Assistant*

## RESEARCH ASSISTANTS

### DE SHAUN BENNET

*School of Education and Fels Institute of Government, School of Arts and Sciences*

### EDUARDO COCCARO

*Philosophy, Politics and Economics, School of Arts and Sciences*

### THOMAS LEE

*Jerome Fisher Program in Management and Technology, Wharton*

### THEODORA OKIRO

*Fels Institute of Government, School of Arts and Sciences*

## RESEARCH FELLOW

### DILLON WEBER

*Production Engineer, Dow Chemical Company; Economics/Chemical and Biomolecular Engineering, School of Arts and Sciences/School of Engineering and Applied Sciences*



# ABOUT US

## MISSION

The Kleinman Center cultivates energy policy innovation and promotes its application—creating opportunities for students, researchers, and professionals to debate viewpoints, explore options, and develop agendas for decision and action.

## VISION

Transition from an energy system with uncompensated external costs to one that optimizes energy productivity through smart demand, internalized impacts, and sustainable supply.

## APPROACH

The Kleinman Center focuses on projects that:

**Foster thoughtful and impactful energy research.** We support Penn research through a variety of programs and bring distinguished energy leaders and scholars to Penn for visits and residencies.

**Develop the next generation of energy leaders.** We engage student learners by providing energy-related courses, a certificate program, lectures, internships, and grants for research and professional development.

**Create conditions for stakeholders to explore options and develop agendas.**

We convene thought leaders with diverse interests in settings that foster productive conversations and action.

## HISTORY

The Kleinman Center for Energy Policy was established in 2014, thanks to a generous gift from Scott (C'94, W'94) and Wendy Kleinman.

## CONTACT

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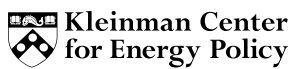
## FINANCIAL OVERVIEW



The established fiscal processes and firm budget structure developed in the first two years of operation allowed us to focus on expanding the scope and impact of Center initiatives in year three.

This year we were able to support six visiting scholars, twice as many as the previous year, as well as engage a greater number of experts in energy, communications, and academic review. Our student grant and internship programs grew significantly, with a wider variety of projects and fellowships funded, including our first Kleinman Birol student fellow at the IEA.





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