Kleinman Center for Energy Policy

CALL FOR RESEARCH PROPOSALS

Overview

Each year, the Kleinman Center for Energy Policy awards grants ranging from $5,000 to $15,000 to support new research or supplement existing research in **energy and climate policy**.

This year, we are seeking requests for proposals from University of Pennsylvania faculty, postdocs, and doctoral students for research projects in the areas of energy and climate policy that can leverage Penn research and support the advancement of our mission. Preference will be given to research on the following topics:

- **Carbon Capture**
- **U.S. Protectionism**
- **Electricity Markets**
- **Energy Poverty**
- **Electric Vehicles**
- **Climate Co-Benefits of Biology-First Agriculture**
- **Nuclear Energy**
- **Hydrogen**
- **Investor Activism**

Note: See Appendix A for an expanded description of each of the above topics.

Expected Outcomes

Grant money may be used from May 1, 2023 through June 2024. At the end of the grant period or upon completion of the research, the grantee will prepare a short policy digest (3,000 words maximum) based on grant-supported research. The digest format allows grantees to consider and connect their research to policy outcomes.

All policy digests must adhere to our review process and guidelines. Final digests will be published in HTML and PDF formats. All peer-reviewed publications resulting from this research must include a Kleinman Center acknowledgement. We will link to these publications from our site.

Please note, while policy digests may cover the same topic and findings as a future related journal article, they should be written for a different audience and should not be submitted to the Kleinman Center with the intention of republishing.

Requirements

To apply, applicants must develop a two-page proposal that includes:

1. Problem Statement and Impact
2. Proposed Work and Method
3. Timeline
4. Requested Funds

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5. Policy Digest Suggested Title
6. Identification of Target Readers (i.e. legislators, senate committee, government, or international agency, etc.)

Note: Ph.D. students must also include a note of support from their supervisor.

Deadline

Applications should be sent to Lucy Corlett (lcorlett@upenn.edu) by **Wednesday, April 12, 2023**.

Eligibility

Our grant program is open to Penn faculty, postdocs, and Ph.D. students and researchers in the areas of energy and climate policy. Energy science and energy technology development projects are not eligible.

APPENDIX A

2023-2024 Topics

Carbon Capture

Seeking to reduce emissions and bolster carbon capture utilization and storage (CCUS), the Inflation Reduction Act (IRA) increased the tax credits (45Q) for CCUS projects that capture carbon from the source or the air through Direct Air Capture (DAC) technology. While the most significant incentives (up to $180/tCO2) will go to projects capturing carbon from the air and storing it in underground reservoirs, projects that plan to use the removed carbon for commercial purposes or Enhanced Oil Recovery (EOR) will also have an extension and increase in tax credits. 45Q tax credits complement funding in the Bipartisan Infrastructure law for CCUS and DAC, including $2.537 billion for the Carbon Capture Demonstration Projects Program, $937 million for Carbon Capture Large-Scale Pilot Programs, and $3.5 billion for Regional Clean Direct Air Capture Hubs.

Questions: How can we ensure that all subsidized EOR projects are carbon negative? How might we incentivize other uses of CO2 differently from EOR? How can we improve compliance with EPA regulations by CCUS projects claiming 45Q tax credits concerning monitoring, reporting, and verification (MRV) plans to ensure the carbon dioxide is being captured and stored? As more oil states are seeking to take over permit reviews and enforcement authority from the U.S. Environmental Protection Agency (EPA) for CO2 and other greenhouse gas storage sites, how can we ensure that state requirements will be as stringent as those of the EPA? What climate and environmental justice considerations should states have for approving CO2 pipelines?

U.S. Protectionism

The IRA includes landmark tax incentives for domestic energy production and manufacturing. On the manufacturing side, components within wind, solar, and battery projects are eligible. At the same time the Trump-era tariffs to solar panels and solar panel components have remained in place. Recently, the U.S. Commerce Department decided to impose new tariffs on imports from some major Chinese solar panel makers who were trying to dodge existing tariffs on Chinese goods by finishing their products in southeast Asian countries.

Questions: What is the financial impact of these protectionist measures for the deployment of renewable energy projects and electric vehicles? Can solar and wind industries remain competitive despite the higher costs of locally produced components? How can we avoid supply chain disruptions as manufacturing industries start to operate in the U.S.? Are there new environmental and labor regulations required to ensure that these new industries do not create environmental harm and deliver "well-paid" jobs?

Electricity Markets

The frequency of extreme weather events, the need to integrate large amounts of intermittent renewables and distributed energy resources (DER), and the need to upgrade the transmission network while maintaining a reliable, affordable and clean electricity supply, is posing many challenges for grid operators.

Questions: What market structure and pricing regime would be most effective to accomplish the many objectives that grid operators face today? How can we eliminate barriers to the participation of DER? Given the challenge of managing the diversity of DER, what models exist to achieve grid optimization while attaining the grid reliability needed in the connected economy? Should the cost of new transmission infrastructure be socialized so that customers who live in states that do not have renewable penetration targets also pay for the transmission needs of customers in states seeking to increase renewable generation? How can we better coordinate the permitting of transmission lines among state and regional regulators?

Energy Poverty

Globally, the invasion of Ukraine and limiting oil and gas supplies due to Russian sanctions and OPEC decisions have resulted in high energy prices. In many countries, these price increases were exacerbated by the devaluation of local currencies against the U.S. dollar driven by anti-inflation measures in the United States. As a result, according to the IEA, the number of people worldwide who live without electricity grew to nearly 775 million in 2022, rising for the first time in 20 years.

In the U.S., despite programs that alleviate the energy burden like tax rebates for households to undertake energy efficiency projects, more than 5.2 million households above the Federal Poverty Line face energy poverty, disproportionately burdening Black, Hispanic, and Native American communities.

Questions: Should subsidies to fossil fuel consumption be justified to alleviate energy poverty worldwide? How can we fight energy poverty while accomplishing global decarbonization targets? How can we ensure that low-income households utilize IRA subsidies for efficient home retrofitting projects? What factors drive the costs of retrofitting? Should energy efficiency programs focus on workforce development to reduce this sector's labor shortage? Given the electrification of buildings and less demand for gas, how can we protect low-income gas users from rising costs associated with rising delivery costs (due to less volume in the pipelines)? What regulatory options exist for affordably implementing electrification in the residential sector? How can natural gas utilities be encouraged to continue aging pipe replacement and leak reduction programs, as the long-term role of the natural gas system is under question?

Electric Vehicles

In addition to expanding credits for purchasing electric vehicles, the IRA ensures credits for up to 30% of the costs of EV charging equipment for individuals and businesses. Additionally, the bipartisan infrastructure bill allocated $5 billion for increasing charger availability over five years, and states are moving to utilize the $1.5 billion that is available to them. However, since the IRA seeks to expand charging in low-income and rural

communities, the new credits have limitations: they only apply to installation in nonurban areas or census tracts with a poverty rate of at least 20%.

Questions: Will the new infrastructure laws incentivize more state investment in EV networks? What is the impact of bringing EV charging to low-income areas? Can charging continue to be subsidized for low-income customers? Should the priority be to improve public transit? What are the differing demands for commuters/residents in different areas?

Climate Co-benefits of Biology-first Agriculture

Modern agriculture relies heavily on synthetic fertilizers and pesticides to provide a growing global population with improved nutrition without dramatically expanding acres of farmland. However, this manipulation of soil chemistry for maximally efficient outputs has come at the expense of soil health. Regenerative agriculture aims to alleviate the environmental impacts of these soil additives by instead promoting natural biological processes that support soil restoration and sustainable cohabitation with surrounding ecosystems.

This shift from a chemistry-centric to a biology-centric method of farming frames a compelling and inquiry-rich research agenda that intersects with energy and climate policy. Minimizing the use of artificial fertilizer in favor of natural sources of soil nitrogen both improves soil health and reduces the direct and indirect greenhouse gas emissions from the production (typically derived from fossil fuels) and application (nitrous oxide) of fertilizer.

Furthermore, soil organic matter is known to contain three to four times as much carbon as the atmosphere or terrestrial vegetation. Theoretically, therefore, even modest changes in soil carbon, over a large enough area, could make a significant contribution to achieving net-zero carbon emissions while also helping to support biologically healthy and robust soils.

Questions: Is it possible to reward agricultural emissions mitigation without the regular use of satellite and/or ground monitoring? If not, what monitoring standards should be used? Are there carbon farming or fertilizer practices that can be consistently beneficial across geographies? Is increasing the organic carbon in soil a scalable sequestration strategy? What are the environmental, social, and adaptation co-benefits of biology-first farming?

Nuclear Energy

Nuclear power provides around 20% of electricity in the U.S., making up about half of the nation's carbon-free energy. Recently, interest in nuclear power has expanded with the development of smaller, cheaper reactors intended to supplement the power grid across the U.S. The Biden administration sees nuclear as necessary to stabilize power supplies as the country transitions away from fossil fuels, and the $1 trillion infrastructure package signed into law last year will allocate about $2.5 billion for advanced reactor demonstration projects. However, there is no long-term plan for managing the plants' hazardous waste materials, and many worry about the longstanding risk of accidents or attacks at nuclear facilities.

Questions: What does increased use of smaller reactors mean for regulation? Do these new reactors solve the bigger issues around nuclear like the operation with renewables and the permanent storage or nuclear waste? What are the impacts of the IRA and infrastructure laws allocating resources for nuclear? Is there potential for nuclear fuel recycling in the U.S?

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Hydrogen

Green hydrogen has great potential as a renewable fuel source, since it can be used in a wide variety of sectors from heating to electricity generation to transport. However, there is no wide-spread infrastructure to deploy hydrogen and federal policies are just beginning to emerge to support a hydrogen economy. The IRA provides tax credits for green hydrogen production, but it is likely still at a market disadvantage, since the current production cost for blue hydrogen is about $1 per kg (without incentives).

Questions: How should policy and regulations incentivize hydrogen deployment? What infrastructure would need to be developed for wide-spread use of hydrogen? Is it operationally feasible to distribute hydrogen for residential use? Can alternative liquid fuels made from green hydrogen, namely ammonia and methanol, have similar widespread use while piggybacking on existing infrastructure? How can the necessary infrastructure for an accelerated deployment of green hydrogen applications be funded? What role should the federal, state, and local governments have on this deployment and funding?

Investor Activism

Environmental law nonprofit and activist investor ClientEarth filed a lawsuit against Shell in the High Court of England and Wales, alleging Shell's 11 directors have failed to manage the risks posed to the company by climate change. Though the organization is a minor shareholder, the lawsuit is supported by Shell's institutional investors, holding a collective $550 billion in assets and more than 12 million company shares.

It is the first notable lawsuit by a shareholder against a board over the alleged failure to properly prepare for a shift away from fossil fuels. The lawsuit comes after an extremely lucrative year for oil: Shell broke its annual profit record and nearly doubled its earnings from 2021, with profits soaring from $19.8 billion to nearly $40 billion.

Questions: With continuing global demand and a need to replace Russian oil, how influential are oil company investors? Do high oil prices limit the effects of investor activism towards climate action? In the absence of investor activism, can divestment from oil and gas companies produce similar climate action? If divestment occurs, what risks are involved with these companies becoming private?