Kleinman Center for Energy Policy

CALL FOR RESEARCH PROPOSALS

SECTION 1: Energy and Climate Policy Grants

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:

- **IRA and BIL Implementation and Evaluation**
- **Grid Oversight**
- **Offshore Wind**
- **Critical Mineral Supply**
- **LNG Exports**
- **Hydrogen**
- **Extreme Heat and Community Resilience**
- **PECO Collaboration**

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

Expected Outcomes

Grant money may be used from May 1, 2024 through June 30, 2025. 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 website.

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
5. Policy Digest Suggested Title and Date of Submission
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 Arwen Kozak (arwenk@sas.upenn.edu) by **Friday, May 3, 2024**.

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, unless they have an energy or climate policy analysis component.

Early-stage projects that do not allow the submission of a policy digest by June 30, 2025, are ineligible. We encourage applicants with early-stage projects to apply to the 2025-2026 grant cycle.

Kleinman Center for Energy Policy

APPENDIX A

2024-2025 Energy and Climate Topics

IRA and BIL Implementation and Evaluation

The Inflation Reduction Act of 2022 (IRA) and the Bipartisan Infrastructure Law of 2021 (BIL) collectively constitute an unprecedented investment from the Biden administration, exceeding $430 billion, to catalyze innovation and capital infusion into renewable energy sources, energy efficiency, clean technologies, and emissions reduction initiatives. This investment comprises tax incentives, grants, and loan guarantees. As these pieces of legislation transition into the critical phase of implementation, it becomes imperative to assess their effectiveness and recalibrate provisions as necessary.

Questions: How are agencies faring in crafting regulations, programs, grants, etc. to implement the IRA and BIL? Are the multiple social, environmental, economic, and industrial objectives of these Acts being accomplished? For example, among the funded projects, what are the project outcomes? Have these projects delivered in terms of community engagement and energy justice objectives? What has been the effect on investment in various low-carbon technologies? Can we estimate the cost per ton of carbon saved, and how does it compare to alternative policies like carbon pricing? What have the implementation challenges been so far, including any tensions among agencies? How are agencies navigating these tensions, and what can we learn from early efforts to inform future implementation strategies?

Grid Oversight

The electricity grid is central to accomplishing decarbonization goals, but its development is severely lagging. A recent report by the National Academy of Science concluded that "Perhaps the single greatest risk to a successful energy transition during the 2020s is the risk that the nation fails to site, modernize, and build out the electrical grid." Despite the rapid surge in renewable energy generation, the deficiency in adequate transmission infrastructure and efficient grid management is beginning to impede further integration of renewables. This shortfall could prolong the operation of fossil fuel generators and jeopardize system reliability, exacerbated by challenges such as extreme weather events, cyber threats, and electromagnetic pulses (EMPs), and more.

Questions: What policies are necessary to construct a grid to support the energy transition? How can reliability and clean energy goals be balanced and co-optimized? How should we evaluate recent efforts by federal regulators to improve grid policy? What more must be done, and how politically might it be achieved? How can the grid increase its resilience in response to physical or cyber-attacks? How can the grid be adapted to coordinate the operation of distributed generation sources?

Offshore Wind

Offshore wind holds significant promise for accelerating the decarbonization of coastal electricity supply, which aligns with demand centers. Furthermore, it stands to enhance the efficiency of current electricity transmission infrastructure and fortify coastal grids. As such, the Biden administration has committed to ambitious targets: 30 GW of offshore wind by 2030 and 110 GW by 2050. However, 2023 proved to be a tumultuous year for offshore wind initiatives, marked by contract cancellations attributed to unexpectedly high costs stemming from supply chain challenges, elevated interest rates, and opposition from local communities (NIMBYism).

Despite ongoing state support through solicitations and the flexibility for companies to renegotiate contracts at higher rates, supply chain bottlenecks persist, as exemplified by developments in New York. A NREL study concluded that “existing international manufacturing facilities likely will not have sufficient capacity to provide components for the United States and global (offshore wind) demand, which could create bottlenecks without a domestic supply chain”. Moreover, customers are bearing the brunt of these higher costs, as evidenced by projects in Virginia where incremental expenses are being passed on to consumers.

Questions: Can the offshore wind industry remain competitive despite the higher costs of locally produced components? Should the IRA threshold of domestically manufactured components to access additional tax credits be lowered for the offshore wind industry? What is the effect of the Jones Act (under U.S. maritime law, only U.S.-flagged vessels can operate out of the country's ports, and there is not yet a vessel capable of installing offshore wind turbines in the market) in the cost structure of this industry? Should regulators allow the full recovery of rising costs? How can the lease auctions be structured to minimize the lease cost that is passed on to end customers? What is the net benefit or cost for costal local communities that will host turbines on their shores?

Critical Mineral Supply

Certain critical minerals, including copper, lithium, nickel, and cobalt, are key components of electronics and technology crucial for the energy transition. However, the heightened demand for these minerals, driven in the energy sector by the surge in renewable energy and electric vehicle production, has strained an already precarious supply chain. Factors such as limited global supply, unsustainable mining practices, political instability in producing regions, and fluctuating international relations contribute to the fragility of this supply chain, undermining the reliability and resilience of energy systems worldwide.

Despite a sharp jump in investment in lithium production, with a 300% increase between 2017 and 2022, the majority of these supplies still come from the Democratic Republic of the Congo, China, and Indonesia; and over 80% of the U.S. supply of critical minerals comes from abroad. While the passing of the IRA, the BIL, and the CHIPS and Science Act aimed, among other objectives, to build local supply capacity and secure reliable supply, it also imposed requirements concerning the sourcing of electric vehicle (EV) and renewable energy industry components to award tax credits. A study by IHS concluded that it will be unlikely for the U.S. to meet the domestic sourcing requirements for cobalt and nickel from local suppliers or from countries with a trade agreement with the U.S. For lithium, given the level of investment and planned U.S. capacity, domestic sourcing requirements could be met according to the study, but project delays could cause the U.S. to rely on sourcing from Free Trade Agreements countries such as Chile. And delays are expected. The average global time from discovery to production of a mine, as reported by S&P, is almost 15 years, and in the U.S. the average permitting time has been 8 years.

Questions: What progress has been made on environmentally sustainable mining and processing of these minerals, and where? How might the diversification of critical minerals suppliers impact geopolitical alliances and dependencies in the global context? Are there geopolitical risks associated with relying on a limited number of non-Chinese suppliers for critical minerals, and how are countries mitigating these risks? What are the effects on the EV and clean energy industries when changing suppliers away from China? How can the approval of mining projects be expedited while maintaining rigorous environmental and energy justice standards? What governance reforms are needed to expedite permitting processes? How can humanitarian concerns be addressed while meeting global supply needs? Given the predicted shortage of supply, how can the surge of illegal mining be prevented? Should copper be considered a critical mineral for the energy transition, and if so, what additional incentives should this industry receive? Is there a case to provide additional incentives or regulations for the recycling of metals?

LNG Exports

With the curtailment of Russian gas supply in Europe due to sanctions and the war in Ukraine, there has been a surge in U.S. liquefied natural gas (LNG) exports. As of 2023, the U.S. has become the leading exporter of LNG globally, shipping over 11 billion cubic feet per day. With seven new terminals under construction, processing capacity is set to rise by 117%. Approval of 11 more projects could boost capacity by 221% in the coming years, if all the approved projects are constructed. However, the Biden administration has recently paused the approvals of new LNG projects earmarked for export to non-free-trade agreement countries. This action stems from the rationale that additional environmental, economic, and energy security reviews are required. This decision has been controversial. At the same time, Quatar announced the largest expansion of its LNG processing facilities, aiming to control nearly 25% share of the global market by 2030. Supporters of the exports pause in the U.S. have raised various concerns: First, that the construction of capital-intensive processing terminals could engender long-term investments that perpetuate reliance on natural gas. Second, that the methane emissions related to the lifecycle of LNG is in tension with long term climate goals. A recent study found that the use of LNG has more greenhouse emissions than the use of locally produced coal due to its methane and carbon footprint and the emissions impact of the tankers transporting it. Third, that all the existing and proposed terminals are located in low-income areas, disproportionally impacting black and immigrant communities. Conversely, critics of the exports pause in the U.S. argue that even though this is only affecting future supply, there are global energy security concerns that could affect not only Europe, but also Japan and other Asian countries. Additionally, the critics contend that these exports create job opportunities in producing states and those jobs are at risk with the pause on exports. They also argued that American LNG could potentially replace coal in Asian markets, thereby contributing to a global reduction in carbon emissions.

Questions: How do LNG exports impact energy security and geopolitical dynamics, particularly in regions reliant on imports from countries like Russin gas or Qatar's LNG? Given Quatar's ties with Hamas and Iran, what are the geopolitical implications in the Middle East and North Africa (MENA) region of a possible future dominant position of Quatar in the LNG market? How do LNG exports compare to other energy sources in terms of greenhouse gas emissions, including both direct emissions and those associated with transportation? What are the emerging technologies and best practices for reducing environmental impacts throughout the LNG supply chain, from production and processing to transportation and end-use? What are the socio-economic effects of LNG projects on local communities, including job creation, income distribution, and infrastructure development? What are the equity considerations in siting LNG terminals, and how do these projects affect marginalized communities, including those with lower incomes or minority populations? Should the U.S. government provide subsidies for the decarbonization of the LNG industry, even though the future carbon-reduced LNG is going to be consumed abroad?

Hydrogen

Through funds allocated in the IRA and the BIL, the federal government has established policies for the deployment of zero-emissions hydrogen. The announcement of seven regional hubs, partially funded by the Department of Energy (DOE), and the release of proposed guidance on the clean hydrogen production tax credit

45V, issued by the IRS, provide certainty for investors and could accelerate deployment. However, the details of how the subsidies and funding for the hubs will be provided can make a significant difference in emissions abatement. A study by the Rhodium Group found a potential risk of increasing emissions if hydrogen production uses existing clean electricity generation capacity, leading the grid to resort to fossil fuel generation to meet growing electricity demand.

Questions: How can hydrogen projects using electricity from existing zero-emitting resources qualify, if at all, for the 45V subsidy? Is there an economic case for green hydrogen produced from nuclear energy? Given the interactions that zero-emissions hydrogen producers will have with electricity markets, how can they be integrated as market participants to achieve a balance between efficient grid management, clean resource adequacy, while maximizing the use of electrolyzers? As the terms of the hub awards have not been predetermined but will be open to negotiations with DOE, what options are available to minimize the risk that hubs do not get constructed? How should the community benefits of the hubs be evaluated? Should hydrogen facilities dedicated to produce hydrogen exports be subsidized?

Extreme Heat and Community Resilience

With rising temperatures due to climate change, heat waves, which are prolonged periods of extreme heat, are also occurring more frequently in major U.S. cities since the mid-20th century. In addition to becoming more common, heat waves are also lasting longer and becoming more severe. Communities with limited access to resources such as air conditioning, cooling centers, and adequate housing are more vulnerable to the effects of extreme heat. Additionally, heatwaves can lead to increased energy demands for cooling, potentially resulting in higher utility bills for residents and businesses.

Questions: What are the key factors contributing to the vulnerability of communities to extreme heat, and how do these factors vary across different demographic groups and geographical areas? How can cities and buildings be built for growing heat? What are the most effective strategies for enhancing the resilience of communities to extreme heat, including the effectiveness of interventions such as cool roofs, green infrastructure, and urban heat island mitigation measures? What are the direct and indirect health impacts of extreme heat and how do these impacts vary across different population groups? What are the economic costs associated with extreme heat, including healthcare expenses, loss of productivity, and infrastructure damage, and how do these costs compare to the investments required for heat mitigation and adaptation measures? What governance structures, policies, and planning processes are most conducive to addressing heat-related challenges? How to change protections and laws for growing heat waves?

PECO Collaboration

PECO, Philadelphia's electric utility, seeks to establish collaborations with Penn researchers to explore the following topics:

- Electrification Forecasting: This involves identifying electricity demand drivers at the circuit level
- Assessment of Non-Wire Solutions: Evaluate solutions to address constraints on PECO’s network without traditional infrastructure upgrades

- Optimal EV Charging Locations: Develop an algorithm and map for public and curbside EV charging, considering EV ownership patterns and equitable access
- Philadelphia Transportation Analysis: Study transportation patterns and employee commuting habits in Philadelphia
- Heating Technology Cost Analysis: Analyze different heating technologies and strategies to increase adoption of high-efficiency options in rental housing
- Utility Control of Smart Inverters: Evaluate direct utility control of smart inverters versus automated grid responses for managing disruptions caused by distributed energy resources (DERs)

PECO can provide data on customer loads, solar installations, EV adoption, distribution voltage, and recent service connections, categorized by census block group, distribution feeder, and transmission substation. The Kleinman grant serves as seed funding, and researchers will negotiate directly with PECO for additional funding needs.

SECTION 2: Carl H. Goldsmith Sustainable Agriculture Fund

Overview

The Kleinman Center for Energy Policy, with the support of a gift from alumnus Carl H. Goldsmith (W '88), has established a Sustainable Agriculture Fund that aims to frame a research agenda at the intersection of agriculture and climate policy with a focus on sustainable agriculture practices, policies, science & technology that alleviate adverse environmental and social impacts.

In the inaugural year, the Sustainable Agriculture Fund will award several grants ranging from $5,000 to $15,000, and one grant up to $50,000 to support new research or supplement existing research in **agriculture and climate policy**. We are seeking requests for proposals from University of Pennsylvania faculty, postdocs, and doctoral students for research projects in the above-mentioned areas that can leverage Penn research and support the advancement of our mission.

Research example that we aim to fund:
Modern agricultural practices are vital in ensuring food security for a growing global population through the use of synthetic fertilizers, pesticides, and other technologies, without dramatically expanding acres of farmland. However, intensive agriculture practices have led to a global collapse in biodiversity, and food systems now account for one-third of global greenhouse emissions. For the first time ever at the 2023 United Nations Framework Convention on Climate Change (UNFCCC) global climate meeting (COP28), an entire day was dedicated to food and agriculture, resulting in a declaration signed by more than 150 countries acknowledging the role of sustainable agriculture as a key part of the response to the climate crisis. Sustainable agriculture aims to alleviate adverse environmental and social impacts by promoting practices such as natural biological processes, soil health restoration, circular systems, water management systems, renewable energy use, deployment of agritech, and improved social, and public health outcomes. The dichotomy between efficiency-focused and sustainability-first agriculture practices frames a compelling and inquiry-rich research agenda that intersects with energy and climate policy.

Questions: What strategies can be developed to enhance the role of sustainable agriculture practices in mitigating climate change, including carbon sequestration, soil health restoration, circular systems, cultivation of biofuel crops, water management systems, and adaptation to changing environmental conditions? What novel approaches can be explored to integrate renewable energy sources into agriculture systems, promoting energy efficiency and sustainability while supporting regenerative farming practices on a local and/or global scale? What are the key impacts of sustainable agriculture on the social determinants and food security of both end-users and farming communities, including aspects such as fair labor practices, poverty reduction, and market access for farmers?

Expected Outcomes

Grant money may be used from May 1, 2024 through June 30, 2025. At the end of the grant period, or upon completion of the research, the grantee will prepare a deliverable as specified in their proposal based on grant-supported research.

The adaptable format of deliverables enables grantees to contemplate and align their research with outcomes and audiences of their choosing. 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.

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
5. Final Deliverable (this can materialize in various formats, such as a policy digest, comprehensive report, presentation, visual aids like infographics and write-ups, or other relevant related formats)
6. Suggested Title and Date of Submission
7. Identification of Target Audience (i.e. legislators, senate committees, government agencies, international organizations, farm communities, investors, public health organizations, ag tech investors, etc.)

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

Deadline

Applications should be sent to Arwen Kozak (arwenk@sas.upenn.edu) by **Friday, May 3, 2024**.

Eligibility

Each applicant can only submit one grant application. We will assess the first grant submission; subsequent submissions will not be assessed. Our grant program is open to Penn faculty, postdocs, and Ph.D. students and researchers in areas related to agriculture, climate policy, health, and technology.