

NATIONAL SCIENCE FOUNDATION
Proposal Abstract

Proposal:1937137

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Proposal Title: Convergence Accelerator Phase I (RAISE): Open Knowledge Network for the Global Energy Data Commons

Institution: Duke University

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The NSF Convergence Accelerator supports team-based, multidisciplinary efforts that address challenges of national importance and show potential for deliverables in the near future.

The broader impact and potential societal benefit of this Convergence Accelerator Phase I project is to create a more robust scientific foundation for energy systems management and planning that will help energy managers, policy makers, and the communities they serve meet national and global energy needs in ways that are reliable, affordable, accessible and sustainable. The phase I effort will begin with expert and stakeholder-driven identification of energy data needs, data development opportunities, methods, and priorities that culminates in a Phase 2 implementation plan for creating a Global Energy Data Commons (GEDC). The planned GEDC will enable researchers, practitioners, and policymakers to access open energy information with much greater data availability and interoperability, allowing significantly more effective decision-making.

The core project team represents a convergence of diverse disciplines including engineering, economics, machine learning, and energy policy and will establish an expert stakeholder working group to collaborate on identifying priority focus areas for the GEDC (and the wider scientific community) that can be rapidly catalyzed for short-term impact. The GEDC platform is intended to (1) inform an energy data research agenda that is driven by user-demand and real-world problems; (2) improve data interoperability and establish a closely coordinated research network; and (3) make energy data more usable to diverse disciplines through curated, centralized databases, online tools, and visualizations. The GEDC will be open to the public and will enable access and exploration of data in multiple formats (tabular, geospatial, etc.). Finally, this project will also contribute to graduate and post-graduate research training through student and postdoctoral engagement.

The energy system presents significant challenges in data availability and interoperability that limit the ability of stakeholders in academia, non-profits, industry, and government to plan effectively. This project will establish a working group of stakeholders who will catalog open data sources, identify effective modes of enabling data interoperability, and evaluate feasible methods of data collection including machine learning approaches for automating the extraction of large-scale energy systems data. Using this information the working group will identify priority areas for focused data collection efforts and plan for execution under Phase II. The GEDC effort has the potential to establish a model for innovative data collection, curation, and sharing that could be replicated in other types of data, and will make all resulting findings and tools publicly available. Data generated to populate the GEDC across both phases I and II will add value to the energy community in key ways including increased interoperability,

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expanded geographic and thematic coverage, higher spatial and temporal fidelity, and centralization of information that has traditionally been separate. These data and accompanying analysis and visualization tools will accelerate meaningful inquiry across numerous disciplines in the social sciences, data sciences, and engineering, and will also facilitate planning and decision making by practitioners and managers.

This award reflects NSF's statutory mission and has been deemed worthy of support through evaluation using the Foundation's intellectual merit and broader impacts review criteria.