CLEAN ENERGY INSTITUTE

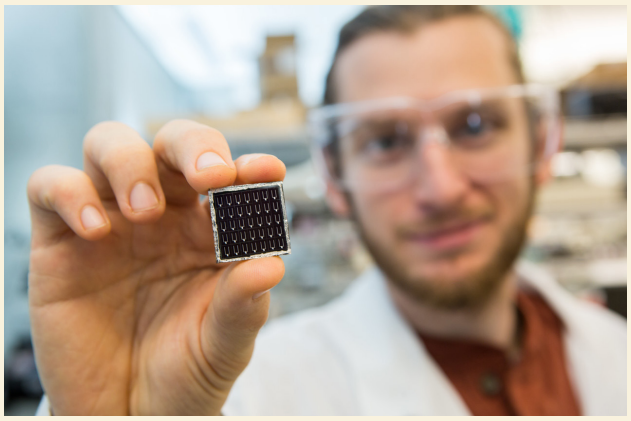
UNIVERSITY of WASHINGTON

The Clean Energy Institute (CEI) at the University of Washington (UW) was founded in 2013 with funds from the state of Washington. Its mission is to accelerate the adoption of a scalable clean energy future that will improve the health and economy of our state, nation, and world.

To accomplish this mission, CEI supports the advancement of next-generation solar energy and battery materials and devices, as well as their integration with systems and the grid. The institute creates the ideas and educates the people needed to generate these innovations, while facilitating the pathways to bring them to market.

CEI seeds programs that focus on clean energy education, innovation, and transformation. This involves:

- Training the next generation of clean energy innovators.
- Supporting novel, high-risk/high-reward research.
- Creating shared facilities with state-of-the-art instrumentation for academic researchers and businesses to help bring cleantech innovations to the marketplace.
- Building a collaborative network of interdisciplinary researchers, business leaders, entrepreneurs, investors, and philanthropists devoted to a clean energy future.



Education Programs

Our signature education and training programs include:

CEI Graduate Fellowship

CEI funds Ph.D. graduate students from departments across UW to explore new research directions in solar energy conversion, energy storage, and grid integration technologies. Fellows participate in cleantech networking events, industry field trips, and lab tours throughout the year. The CEI Interdisciplinary Seminar Series provides fellows the chance to host and meet internationally renowned clean energy experts.

DIRECT Program

Data Intensive Research Enabling Clean Technologies (DIRECT) is a training program for graduate students funded by the National Science Foundation (NSF). The program involves: 1) graduate coursework at the nexus of data science and advanced materials for energy; and 2) capstone projects where students work in teams to tackle real-world problems for clients from industry and national labs.

Clean Energy Bridge to Research

A summer research program funded by NSF for undergraduates at community colleges and four-year colleges, and community college teachers. Participants conduct authentic clean energy research with mentorship from UW's world-class faculty and graduate students.

Transformational Facilities

CEI is creating new facilities to reduce the time and capital needed to translate research discoveries into scalable energy products.

Washington Clean Energy Testbeds

CEI created the Washington Clean Energy Testbeds to accelerate the development, scale-up, and adoption of new technologies in solar harvesting, energy storage, and grid integration. This open-access facility for academic researchers and businesses houses labs for manufacturing prototypes, testing devices, and integrating systems.

Center for Advanced Materials and Clean Energy Technologies (CAMCET)

As part of UW's plan to create an innovation district in Seattle, CEI has put forth a proposal for a new mixed-use building that would: 1) expand interdisciplinary research in clean technologies; 2) increase campus capacity for STEM degree production; and 3) provide unique spaces for project-based learning and academic partnerships with industry and government. CEI's vision is that CAMCET will be an innovation hub that connects the university with key business and government partners to accelerate solutions for a healthy planet.

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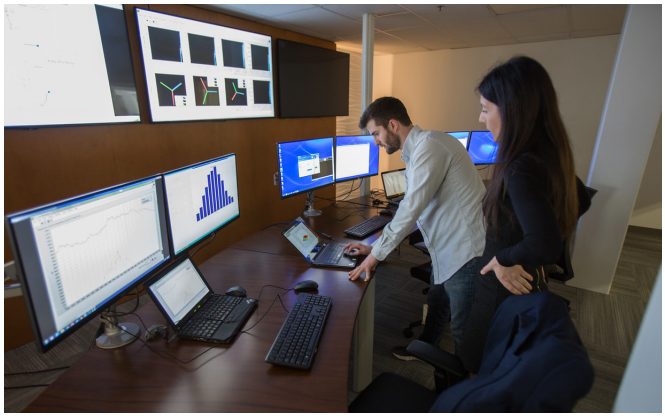

Facts about CEI

- Founded in 2013
- $3 million annual operating budget
- 30 faculty from across disciplines
- 104 CEI Graduate Fellows
- 34,000 Washington K-12 students reached through outreach events and classroom mentorship

Institute Leadership

Director

Daniel Schwartz

Boeing-Sutter Professor, Chemical Engineering

Chief Scientist

David Ginger

Alvin L. and Verla R. Kwiram Endowed Professor of Chemistry and Washington Research Foundation Distinguished Scholar

Technical Director, Washington Clean Energy Testbeds

J. Devin MacKenzie

Washington Research Foundation Innovation Professor of Clean Energy and Associate Professor of Mechanical Engineering and Materials Science & Engineering

Research Leadership

Solar Energy

CEI students and faculty are tackling the grand challenge of building high-efficiency solar cells using ultra-low-cost manufacturing processes that are as cheap as printing a newspaper.

We lead groundbreaking research in an array of materials that can be coated and printed and are environmentally benign. For example, hybrid perovskites are a rapidly improving class of materials for printable solar cells. Perovskites already match the efficiencies found in conventional silicon solar cells and allow for whole new device architectures. In addition, electronic polymers have the potential to transform solar cells—they are already improving consumer electronics, lighting, and displays.

Battery Materials & Operation

CEI researcher teams are pushing the envelope on batteries that can store much more energy than current lithium-ion cells. The goal is to develop breakthrough, but low-cost, materials and battery designs that can fully utilize new high-performing materials.

Our researchers are also exploring high-energy-density lithium-negative electrodes along with a variety of next-generation positive-electrode materials. Every advance in high-energy materials requires new knowledge and improvements in battery operations and control. Safely getting the longest life and highest performance out of each new material is a critical part of our research.

Integrated Systems

As renewable solar and wind generation grow on the electricity grid and as vehicles continue to be electrified, we require a whole new degree of automated grid flexibility. A “smart,” integrated grid has the ability to rapidly adapt to the fluctuations in generation while still meeting user demands—ideally without firing up dirty fossil generators.

Our students, faculty, and partners study how information technology and advanced analytics can optimally be used to plan, forecast, and control grid assets. For example, CEI researchers and partners at Washington State University and Pacific Northwest National Laboratory are implementing innovative software and hardware across Washington state to understand the best use of transactive communications as the backbone for a reliable and affordable smart grid.