CLEAN ENERGY INSTITUTE

The University of Washington Clean Energy Institute (CEI) was founded in 2013 to accelerate the adoption of a scalable and equitable clean energy future that will improve the health and economy of our state, nation, and world.

To accomplish this, 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 programs:

- Support novel, high-risk/high-reward research.
- Train the next generation of clean energy leaders.
- Create shared facilities for climate tech innovation.
- Engage civic organizations, tribal nations, and K-14 students and teachers in the energy transition.



CEI Graduate Fellow Mareldi Ahumada-Paras (left) and a homeowner install solar panels in Jayuya, Puerto Rico after Hurricane Maria.

46 Member Faculty

Chemical Engineering
Chemistry
Computer Science & Engineering
Construction Management
Electrical & Computer Engineering
Industrial & Systems Engineering
Materials Science & Engineering
Mechanical Engineering
Physics
Urban Design and Planning

38 Affiliate Faculty

College of Arts & Sciences
College of Built Environments
College of Engineering
College of the Environment

Established in 2013

6 CEI members named *Forbes* 30 Under 30: Energy

158 climate tech investing and science policy traineeships for UW graduate students

283 UW students enrolled in Energy Materials, Devices, and Systems lab course

339 CEI Graduate Fellowships awarded to UW Ph.D. students

22,600 WA K-12 students and teachers reached by Clean Energy Ambassadors

$135.1M federal funding for five research centers and consortia led by CEI faculty

Research

Solar Energy

CEI scientists and engineers are tackling the grand challenges of building high-efficiency solar cells and developing ultra-low-cost manufacturing processes. They lead groundbreaking research in an array of printable, environmentally-benign materials, such as hybrid perovskites that already match the efficiency of conventional silicon solar cells. CEI researchers are also developing organic light-harvesting polymers that can flex like fabric.



UW mechanical engineering undergraduate student Sebastian Bustos-Nuno holds a perovskite solar module in the Washington Clean Energy Testbeds.

Energy Storage

CEI research teams are working at the cutting edge of both alternative forms of existing battery materials, like 3D structured Li-ion electrodes, and new frontiers in battery materials and chemistry. The goal is to develop breakthrough, low-cost materials and battery designs for a variety of applications, from grid-scale energy storage to electric vehicles and aircraft.

Energy Systems

As clean energy generation and storage grows on the electricity grid and as transportation, buildings, and industry 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. CEI researchers study how to use software and hardware to plan, forecast, and control grid assets.

CEI Leadership

Director

Daniel T. Schwartz

Boeing-Sutter Professor of Chemical Engineering

Chief Scientist

David Ginger

B. Seymour Rabinovitch Endowed Chair in Chemistry

Washington Clean Energy Testbeds Technical Director

J. Devin MacKenzie

Washington Research Foundation Innovation Professor of Clean Energy

Associate Professor of Materials Science & Engineering and Mechanical Engineering

Advanced Materials & Measurements

CEI researchers are pushing the boundaries of light and matter to enable future clean energy technologies. Advances in fields like 2D materials, nanoscale and quantum properties, imaging and spectroscopy lay the foundation for tomorrow's discoveries and devices.

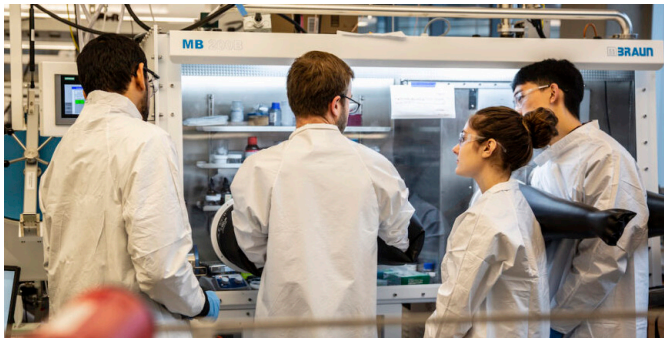
Education

CEI Graduate Fellowship

CEI funds UW Ph.D. students across a variety of fields to conduct cutting-edge, original research that advances CEI's mission of accelerating clean energy adoption. Fellows participate in climate tech networking events, industry field trips, lab tours, and K-12 classroom visits.

Energy Materials, Devices, and Systems Lab Course

CEI member faculty created an interdisciplinary energy lab, the Research Training Testbed, and a hands-on course housed there, "Energy Materials, Devices, and Systems," to train students across the scales of clean energy. Upper-division undergraduates and graduate students get project-based training on materials for energy generation and storage, and the integration of renewables into energy systems.



UW students collaborate across disciplines in CEI's Research Training Testbed.

Torrance Tech Due Diligence Program

This program builds Ph.D. and M.S. students' professional skills while exposing them to how investors evaluate early-stage companies. Participants work with E8, a climate tech angel investment group, using their STEM training as technical consultants on due diligence teams.

Torrance Science Policy Analysis Program

This program provides Ph.D. and M.S. students with experience translating technical research for audiences with varied backgrounds and insight into real-world policy processes and how scientists and engineers can play in advising decision makers. Participants work with the Washington State Academy of Sciences (WSAS) to support policymakers and practitioners, contributing to multidisciplinary assessments, expert briefings, and interactive programs that support evidence-informed decision making and collaborative action.

Graduate Certificate in Clean Energy Science, Engineering, and Society

This 15-credit certificate, open to all UW graduate students, provides an interdisciplinary curriculum on the challenges and opportunities in clean energy and its adoption in society.

Community Capstones in Clean Energy

Teams of UW Engineering seniors partner with local communities and tribes to explore and co-develop clean energy solutions. Students serve Washington's communities and gain critical experience working with diverse clients while leveraging technical resources and staff expertise at the Washington Clean Energy Testbeds. Community Capstones enable partner communities to access specific engineering talent while building up their own capacities for climate action by participating in the co-design process.

CLEAN ENERGY INSTITUTE
UNIVERSITY of WASHINGTON

Washington Clean Energy Testbeds

CEI established the Washington Clean Energy Testbeds to accelerate the development, scale-up, and adoption of new climate technologies. This open-access facility in Seattle, founded on the principle that users retain all intellectual property, offers customized training and use of instruments for fabricating prototypes, testing devices and modules, and integrating systems. The facility also houses meeting and office space where users from academia and business work and collaborate. Through industry events and Experts-in-Residence programs, the Testbeds are an active gathering space for climate tech innovators and investors.





The West Coast's first open-access lab for industry-format battery fabrication

The new lab at the Testbeds enables UW and industry users to produce batches of pouch cell batteries allowing for development and testing at commercially-relevant scales. The standard-size pouch cell has a capacity of 1 to 10 amp-hours.

Testbeds Programs

Entrepreneur-in-Residence (EIR)

EIRs host regular public events and office hours to council entrepreneurs, researchers, and students.

Investor-in-Residence (IIR)

Offered in partnership with E8 Angels, the IIR advises on funding proposals, financial strategy, fundraising, and strategic partnerships.

Life Cycle Assessment

Innovators can work with a Ph.D. staff scientist to identify the most significant financial and environmental costs of making and using their product — from from raw materials to the end of its useful life — and develop more sustainable solutions.

Undergraduate Research Award

UW undergraduates in their third year or higher can win $3,000 grants to conduct innovative research in clean energy, climate tech, or advanced manufacturing at the Testbeds.

Opened in 2017

1000+ users

from 180+ companies and academic institutions from around the world

over $1B secured

by Testbeds-affiliated startups in follow-on capital and contracts

$16.5M invested

by WA State Legislature, UW, and Washington Research Foundation

2018 Energy Leadership Achievement Award

from CleanTech Alliance and Northwest Environmental Business Council

Community Engagement

To promote the equitable adoption of clean energy technologies in Washington state, CEI provides communities and tribes with technical assistance for clean energy projects, partnerships with UW scholars to co-design and perform research, and clean energy education and training modules for K–12 and two-year college students. CEI provides these services *pro bono* to support community decision-making and participation in state and federal programs for decarbonization and resiliency.

Community Research & Project Support

CEI has established three pathways for communities to partner with UW students, faculty, and staff to co-develop clean energy strategies and execute projects.

1. **Open-ended exploration and analysis via UW Engineering capstone projects**
2. **Microgrid technical analysis**
3. **Deep-dive research collaboration**



UW Engineering students with Beacon Hill Council Chair Maria Batayola (left), Testbeds staff scientist Bosong Li (third from left), Rep. Sharon Tomiko Santos (third from right), Rep. Mary Fosse (second from right), and Aaron Wheeler (right), legislative assistant for Sen. Tina Orwall, at CEI's 2025 Community Capstone Showcase.

Communities can **contact uwcei@uw.edu** to explore goals such as:

- Reducing electricity cost burdens or generating income
- Lowering emissions and improving local air quality
- Electrifying key industries and services
- Sustaining energy supplies during power outages
- Investigating energy burdens and/or the clean energy transition

K–14 Engagement

Our K–12 and undergraduate learning resources incorporate cutting-edge clean energy research. Activities include STEM lesson plans, "Meet a Scientist" classroom visits, and "SunDawg" solar car kits.



Educators can visit cei.washington.edu/sundawg to request SunDawg kits to be delivered by mail.



Showalter Middle School teacher Adilene Sanchez (left) and CEI Graduate Fellow Sophie Song (right) build an aluminum-air battery.

Our teacher workshops enable participants to explore ways to bring clean energy concepts into their STEM classrooms. Educators can try out hands-on lesson plans, tour UW labs like the Research Training Testbed, and connect with CEI researchers.