



institute 
for **sustainability**
An AIChE Technological Community

2023
ANNUAL REPORT

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Mission Statement

AICHE's Institute for Sustainability (IfS) is a network of experts in science, engineering, and finance dedicated to developing and implementing new technologies and practices through multidisciplinary collaboration. Member companies and their individual members benefit from joint projects and pre-competitive research, keeping them at the forefront of sustainability technologies and developments.

The mission of IfS is to support and influence professionals, academics, industries, and governmental bodies that contribute to sustainability and sustainable development. By integrating engineering and scientific disciplines, IfS aims to promote the societal, economic, and environmental benefits of sustainable and green engineering.

The Managing Board of IfS provides guidance on issues and activities important to IfS and its constituents. It collaborates with other sustainability entities, advises on long-term strategies, and approves projects and annual budgets.

2023 Managing Board



Darlene Schuster
AIChE® CEO and ED
IfS MB Chair



Barbara Valentine
AIChE® CFO



Ignasi Palou-Rivera
RAPID®, Sustainable Engineering
Forum (SEF)



David Shonnard
Michigan Technological University,
IfS Chair



Peter Lodal
D&H Process Safety,
AIChE® Treasurer (BOD Liaison)



Hugh James
PCG, Inc., AIChE® Board of
Directors (BOD Liaison)



Fengqi You
Cornell University, Chemical
Engineering Technology Operating
Council (CTOC)



Jeffrey Seay
University of Kentucky, Sustainable
Engineering Forum (SEF)



Alex Orlov
Stony Brook University,
Environmental Division (ENV)



Debalina Sengupta
Texas A&M, Fuels and
Petrochemicals Division (F&PD)



Deb Grubbe
Operations and Safety Solutions,
LLC., Public Affairs & Info Committee
(PAIC)



Dale Keairns,
Deloitte Consulting LLP



Lise Laurin
Earthshift Global



James Bero
Retired BASF



David Klanecky
Cirba Solutions



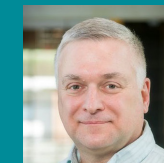
Cliff Kowall
Lubrizol



Isa Mbaraka
Dow



Daniel Slanac
CovationBio



Gerhard Wittreich
University of Delaware



Lucy Alexander
AIChE® Managing Director

The IfS Annual Report highlights the sustainability advances of 2023, aligned with AIChE's three key pillars of progress:



Advancing the Chemical Engineering Profession



Driving Career Growth & Education



Meeting Societal Needs



Membership

AIChE's Institute for Sustainability (IfS) is a member-driven organization pushing the sustainability profession forward. IfS members have access to resources that help drive change and define excellence in the field. [Learn more](#)

Technical Resources

Keep apprised of new developments in the chemical engineering profession through **CEP magazine**, **AIChExchange** and **SmartBrief** and exclusive IfS member newsletters, as well as **Journals** published in partnership with Wiley.

Exclusive Technical Content

Access scientific and technical opportunities and research for sustainability discussions. IfS approaches sustainability from the perspectives of engineering and scientific disciplines to promote the societal, economic, and environmental benefits of sustainable and green engineering. Topics within IfS to interact with:

- Alternative/Renewable Energy
- Food-Energy-Water Nexus
- Resilience and Adaptation
- Sustainability Education
- Waste Management
- Circular Economy
- Plastic Lifecycle Management
- Sustainable Development
- Water Initiatives

Conferences

Members enjoy the lowest rates on both virtual and in-person conference registrations.

Education

Enhance your knowledge and skills through live and archived webinars, credentials, and self-paced eLearning courses.

Advance Your Career

Whether you are actively searching or just researching possibilities, CareerEngineer is the leading e-recruitment source for chemical engineers at every level, in every field.

AIChE Engage

Cultivate meaningful professional relationships through AIChE Engage, the mobile-friendly community discussion platform.

Funding Opportunities

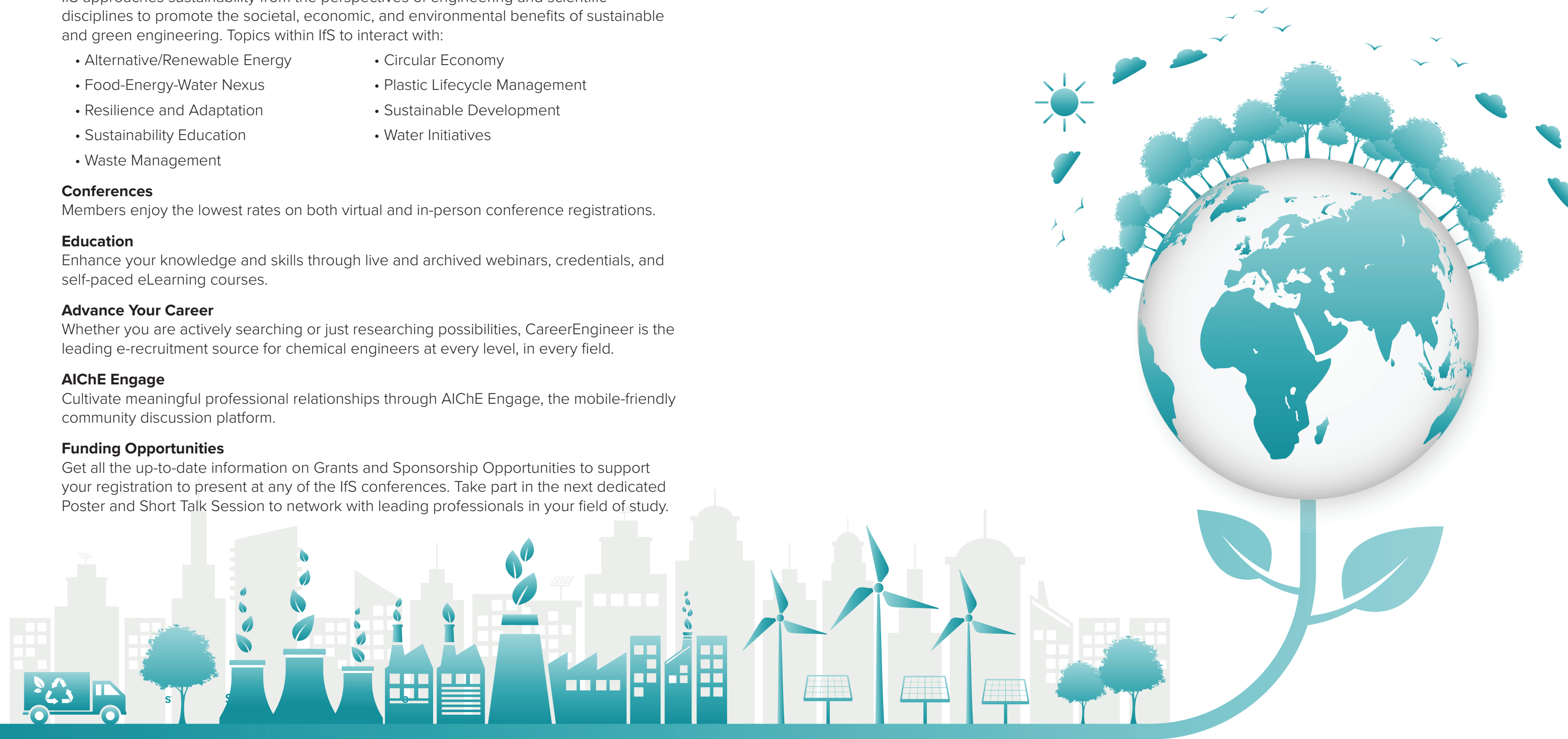
Get all the up-to-date information on Grants and Sponsorship Opportunities to support your registration to present at any of the IfS conferences. Take part in the next dedicated Poster and Short Talk Session to network with leading professionals in your field of study.

Renew Today!

Renewing your **IfS Membership** is your best way to stay connected with all the latest news and upcoming events relevant to sustainability in 2024. Don't lose connection with your sustainability community.

Volunteer with us!

IfS is actively recruiting for **volunteer positions** including a Newsletter Research Contributor. Learn more and apply on the Volunteer Central platform. Have another idea to contribute? Email us with any suggestions to ifs@aiche.org



Conferences

AIChE Conferences hosted and supported by the IfS on topics covering sustainable manufacturing, addressing climate change, the energy transition, and more.

Critical Material Accelerated Development Workshop

September 18, 2023

Houston Marriott Westchase, Houston, TX co-located with ICOSSE

AIChE received a grant from the United Engineering Foundation (UEF) to hold a multi-disciplinary workshop on increasing the supply of Critical Materials in the United States. The workshop featured keynote talks, networking opportunities, moderated panels and facilitated discussions, which will be captured in a final report. Students and Post Docs are also encouraged to attend and highlight their relevant research in a poster session.



International Congress on Sustainability Science & Engineering (ICOSSE)

September 19 - 21, 2023 • Houston Marriott Westchase, Houston, TX

Conference Sponsor: Wiley

ICOSSE serves as the international platform for innovation in sustainability science and engineering to discuss the trends towards greater sustainability.

Featured Topics

• Food

Sustainable technology for food production, reducing carbon footprint, water consumption, and energy.

• Energy

Advanced and renewable energy technologies, energy transition policies, clean energy solutions, data analysis, and energy services.

• Water

Water quality, treatment technologies, policy, and conservation.

• Materials

Sustainable materials, circular use, and policy imperatives.

Hosted by the AIChE's Institute for Sustainability (IfS)

The Water Track at ICOSSE'23 was generously supported by Norman & Jane Li through their donation to the **AIChE Foundation's Doing a World of Good campaign**.

The Institute of Sustainability partially supported the attendance of 12 students through a funding opportunity from PPG. PPG's support is part of the AIChE Foundation's Doing a World of Good campaign, Positively Impacting the Profession and Society for Decades to Come.

Hosted by the AIChE Institute for Sustainability (IfS)



Chemical Ventures Conference (CVC)

September 26 - 27, 2023 • University of Houston, Houston, TX

Conference Sponsor: SABIC

This conference focused on innovation, investment, and deal flow in the chemical space, with focus on climate change, the energy transition, and sustainable technologies. Over two days, participants discovered new trends, emerging industry needs, and cutting edge technologies and connected with the people driving them.

Interactive Panel Discussions on the following topics:

- How to Tap into Government Resources and Funding
- Seeking Early Seed Funding from Angel Groups and Early Stage Funds
- Working with Corporate Venture Groups
- Lessons Learned in Venture Capital from Late Stage Founders
- Pitches from selected Startup Companies

Hosted by AIChE's Center for Innovation and Entrepreneurial Excellence (CIEE)



Battery and Energy Storage Conference

November 15 - 17, 2023 • Argonne National Laboratory, Lemont, IL

This annual conference engages scientists, engineers, and policymakers working in the fields of energy storage and conversion technologies to identify, communicate, and explore advancements in storage materials, devices, and systems.

Featured Topics

- Transportation Electrification
- Grid-Scale Energy Storage
- Manufacturing & Recycling
- Future of Energy

Hosted by the AIChE Center for Energy Initiatives (CEI)



AIChE® Annual Meeting

The IfS's collaborating communities, including the Sustainable Energy Forum and Environmental Division, hosted dozens of technical sessions with invited and selected presentations, poster sessions, and awards sessions at the 2023 AIChE Annual Meeting.

CSPI Townhall - Climate Change Policy

The AIChE Climate Solutions Policy Initiative (CSPI) was launched in 2022 to inform policymakers on climate strategies. At the 2023 AIChE Annual Meeting, a town hall was held to update the AIChE climate policy. The new draft highlights chemical engineers' roles in reducing emissions and developing energy and carbon removal solutions. The final draft will be reviewed by the AIChE Board in 2024.

Education/Staff Development



At every stage of your career, **AICHE® Academy** is the definitive resource engineers use to sharpen their professional skills. AIChE Academy offers up-to-date courses and webinars in chemical engineering, process safety, sustainability, professional development, and many more.

New Sustainability Courses

Two new sustainability courses have been developed by the AIChE Academy in 2023.

- **ELA132** An Introduction to Large-Scale Energy Production
- **ELA137** Fundamentals of Climate Change and Mitigation
This course is due to launch in 2024; developed with funding from a UEF Grant

Additional courses available at the AIChE Academy pertinent to IfS community include:

- **ELA141** Essentials of Environmental Life Cycle Assessment
- **ELA354** A Practical Guide to Life Cycle Assessment (LCA) and Life Cycle Thinking
- **ELA136** Product Stewardship
- **ELA114** Body of Knowledge in Sustainability Overview

AICHE® Credential for Sustainability Professionals (ACSP)

Work on the renewal of the first course of the AIChE Credential for Sustainability Professionals is underway, with launch date in early 2024.

Take this 3-hour online course to understand the concepts and tools that define professional competency in the multidisciplinary areas of sustainability. Learn about the connectivity among society, the economy and the environment as well as the sustainable engineering principles you need for decision-making and problem solving. Get an overview of the AIChE Institute for Sustainability (IfS) Body of Knowledge in Sustainability and how it applies to you.



This course was developed with support from the **AICHE Foundation Doing a World of Good Fund**, and is due to launch in Spring 2024.



The Sustainable Energy Corps is being developed to provide a shared total system measurement, analysis, and education approach for ensuring activities deliver the targeted benefits. The Sustainable Energy Corps will set improvement priorities based on total emissions data across energy supply chain segments. The SEC Engine will engage stakeholders in the Texas/Louisiana area, and the proposed Type-1 activities will congregate this community to solidify the scope and prepare the Engine for a Type-2 proposal.

In 2023, the SEC used grant funding from the United Engineering Federation (UEF) to expand the work to 8 student teams around the world to engage in active projects.



Sponsorship

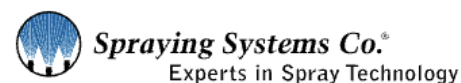
Corporate and individual sponsorship supports key sustainability initiatives including conferences, education and workforce development, publications, awards, and meaningful student programs highlighted in this report. [Learn more](#)

Benefits to Corporate Sponsors

In general, IfS Corporate Sponsors are entitled, but not limited, to:

1. Opportunities to set program and activity priorities through membership on the Advisory Board and Project Committees.
2. Participation on the Center for Sustainable Technology Practices Advisory Board and industry Project Committees.
3. Membership in IfS for company employees.
4. Prominent recognition in IfS promotional media and at events.
5. Recognition in an Annual Report.

JUST SOME OF OUR SPONSORS

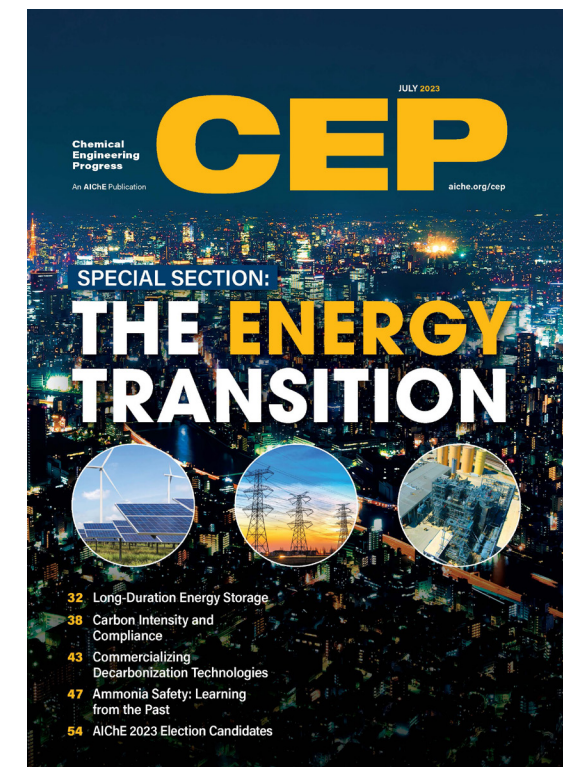


Publications

Chemical Engineering Progress (CEP) Magazine

The AIChE publication Chemical Engineering Progress (CEP) published the July 2023 special section called “**The Energy Transition.**” This section featured the following articles:

- **Energy Update:** Electrifying industrial heat demand is paramount to achieving net-zero emissions in the energy system.
- **Long-Duration Energy Storage Can Lead the Clean Energy Transition:** Emerging long-duration energy storage technologies will be a critical factor in the decarbonization of energy generation
- **Previewing the U.S. DOE’s Industrial Decarbonization Roadmap:** The roadmap provides a framework for technology pathways needed to achieve net-zero GHG emissions in the industrial sector by 2050.
- **The Importance of Carbon Intensity and Compliance to Meet Decarbonization Goals:** Determining a product’s carbon intensity is the first step in understanding the value of that product and taking advantage of the carbon markets available.
- **Commercializing Decarbonization Technologies:** Pilot testing is one key step of de-risking commercialization.



The complete 24-page special section is available for [download](#).

Awards

Sustainability recognitions are awarded via nominations to recognize individuals' or teams' contributions towards protecting our planet and promoting sustainable practices. By nominating them, you can help raise awareness about their work and inspire others to follow in their footsteps. Don't miss this chance to honor those who are making a significant positive impact on our environment. Below are the award winners of 2023 – these annual awards are open for nomination for 2024.

AIChE® Institute Awards

The **2023 Energy and Sustainability Award** was bestowed upon The Prime RO (Reverse Osmosis) Team at Dupont Water Solutions.

The Energy and Sustainability Award is given annually to individuals in industry, teams from industry, or entire companies who have accomplished significant energy savings, improved the sustainability of chemical processes, or developed innovative technologies for energy generation or delivery that hold significant promise of favorable economic or environmental impact.

2024 Deadline for Nominations: February 15, 2024



Environmental Division (ENV)

Below are the winners of the following awards, awarded by the Environmental Division:



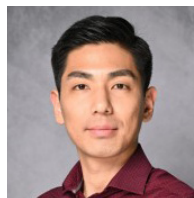
Lawrence K. Cecil Award in Environmental Chemical Engineering
Dr. Michael Wong, Professor and Chair, Department of Chemical and Biomolecular Engineering at Rice University, Houston, TX.

2024 Deadline for Nominations: June 1, 2024



Environmental Division Early Career Award
Dr. William Tarpeh, Assistant Professor of Chemical Engineering at Stanford University

2024 Deadline for Nominations: June 1, 2024



Environmental Division Graduate Student Paper Awards
1st Place: Masayuki Takeuchi (Georgia Institute of Technology)
'Non-linear effects of secondary organic aerosol formation and properties in multi-precursor systems. *Nature Communications* 2022



Environmental Division Graduate Student Paper Awards
2nd Place: Ying Liu (Lamar University)
'Eco-Friendly Natural Gas Monetization Complex for Simultaneous Power Generation and Nitrogen-Based Fertilizer Production. *Industrial & Engineering Chemistry Research* 2023'



Environmental Division Graduate Student Paper Awards

3rd Place: Km Protttoy Shariar Piash (West Virginia University)
'Integrating chemical precipitation and membrane separation for phosphorus and ammonia recovery from anaerobic digestate. *AIChE Journal* 2022'

2024 Deadline for the Environmental Division Graduate Student Paper Awards: July 1, 2024



Sustainable Engineering Forum (SEF)

Below are the winners of the following awards, awarded by the Sustainable Engineering Forum:



SEF Research Award Winner

Professor Prodromos Daoutidis from the University of Minnesota

2024 Deadline for Nominations: June 1, 2024



SEF Student Paper Award Winner

Michael Charles from Ohio State University

2024 Deadline for Nominations: June 1, 2024



EPA P3 Award Winner

Gonzaga University, led by Kyle Shimabuku



CECIL AWARD

The AIChE® Foundation is delighted to collaborate with the Environmental Division in establishing the Environmental Division Endowment Fund. The fund will support AIChE's most prestigious environmental award, the Lawrence K. Cecil Award, in perpetuity.

As environmental issues are coming to the forefront of the chemical engineering profession, we need to be equipped with cutting-edge research and tools to address the many environmental challenges, including climate change. The endowed fund enables us to celebrate the environmental accomplishments, recognize outstanding leaders of our profession and inspire the new generation of chemical engineers to be better stewards of our planet. Our goal is to raise \$50,000 to sustain the award.

Please contact **Natalie R. Krauser, Associate Director of Development**, natak@aiche.org with any questions.

Collaboration

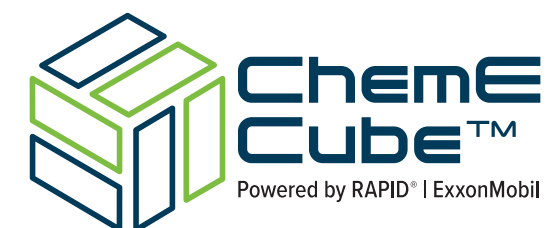


The AIChE Institute for Sustainability has been developing ways to work more closely with the **RAPID Manufacturing Institute** and collaborate on projects of common goals to enable the decarbonization of the chemical industry.

The U.S. Department of Energy's (DOE) Industrial Efficiency and Decarbonization Office (IEDO) announced renewed funding for the Rapid Advancement in Process Intensification Deployment (RAPID) Institute — one of DOE's seven Manufacturing USA Institutes. The 5-year, \$40 million investment will propel research, development, and demonstrations (RD&D) of advanced process technologies to enable more resilient, lower cost, and reduced energy and carbon footprint manufacturing in the process industries. This includes the production of chemicals and fuels, which account for more than a third of all U.S. industrial emissions and energy consumption.



RAPID® aligns institute metrics with the UN SDGs, empowering RAPID and its members to drive impact and make measurable progress toward these global targets.



The **ChemE Cube Competition Powered by RAPID | ExxonMobil** has completed its 2023 competition at the 2023 AIChE® Annual Conference in Orlando. Launched in 2020 by the RAPID Manufacturing Institute®, ChemE Cube is an annual student competition where undergraduate university teams design, build, and demonstrate a 1 cubic foot plant to produce a chemistry defined in the annual problem statement.

Teams compete on cube performance via a head-to-head duel and promote their technology through a 1-minute ad, poster, and 20-minute 'shark tank' style pitch to a panel of mock investors.

The 2023 problem statement was focused on direct air capture – a theme that was influenced by the United Nations Climate Change aim to reduce CO2 emissions. The Paris Agreement was adopted in 2015 with the goal of limiting the rise in average global temperature to well below 2°C — preferably to 1.5°C — above pre-industrial levels. Many chemical engineering innovations and carbon sequestration technologies will be required to meet this goal. To that end, the 2024 competition will continue to focus on direct air capture of CO2 but now features a regeneration requirement.

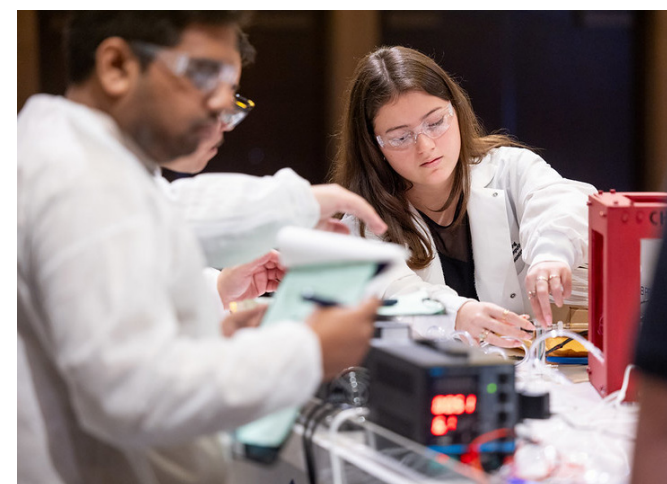
First Place: University of South Carolina

Runners-Up: Virginia Tech

RAPID Award: Tecnológico de Monterrey

Outside-the-Cube Award: University of Illinois, Chicago

Entrepreneur Award: University of South Carolina



Interested in learning more, participating in, or sponsoring ChemE Cube 2024?
[SIGN UP HERE.](#)

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For information about AIChE's Institute for Sustainability (IfS),
contact us at ifs@aiche.org or visit our website at www.aiche.org/ifs