CLE AIChE
The Global Home of Chemical Engineers

American Institute of Chemical Engineers, Cleveland Section

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Thursday, October 10, 2024, 6:00 PM

M.W. Wilson Company, 2579 Center Road (Rt.303)
Hinckley, OH 44233); Phone: 330-225-0663

Membership is Not Required to attend any meetings.

Steam and Condensate System Operation

Abstract: W. M. Wilson Company, Inc is a Manufacturers' Representative/Distributor of steam specialties and process safety equipment that has been serving the industry since 1945. Recently, W. M. Wilson Company, Inc has opened a comprehensive hands-on, steam system training facility, located at their main office in Hinckley, Ohio. The facility will provide an up-close and personal view of how the components in a steam system operate inside and out, and how to make your steam distribution system more efficient. This is a Steam School – not a Sales School.

Bio: Mr. Jeff Wilson served in the US Coast Guard before coming to W.M. Wilson Company, Inc. in 1989. He has worked in all aspects of the business, including performing steam trap surveys and steam audits. Jeff is a DOE Trained Steam System Assessment Tool (SSAT) Qualified Specialist and considers himself "ugly to the bone" when it comes to steam knowledge. The session will include dinner.

For those attending this event and interested, a Professional Development Hour Certificate (1 PDH) will be available to you in the following days by Joe Yurko.

Meeting Location:

2579 Center Road

Hinckley, OH 44233

Phone: 330-225-0663

Menu:

M.W. Wilson Company Dinner Buffet

CLE AIChE Professional Members cost: Free
CSU AIChE Student Members cost: Free

M.W. Wilson Company, 2579 Center Rd. (Rt.303), Hinckley, OH 44233

6:00 – 8:00 pm: Presentation by: Mr. Jeff Wilson

Meal by: M.W. Wilson Company

RSVP Recommended by Thursday 03Oct2024 with Joseph Yurko and AIChE at: yurkojoe5@gmail.com

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AIChE Annual Report from 2023:

https://www.aiche.org/sites/default/files/docs/pages/2023_aiche_annual_report_v07.pdf

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NE Ohio Project Team Looking for Chemical Engineering Consulting Services

A project in NE Ohio is seeking chemist or chemical engineer to provide consulting services for a forthcoming project. The project includes designing and building a test station to calibrate flow meters and instrumentation used in an industrial process. The fluid in the process is caustic and toxic. The goal is to find a solution that is safe to use and has similar physical properties to the existing fluid. The consulting services would include evaluating the existing fluid and identifying the test fluid. Information on the existing fluid and samples of the fluid are available. The project is ready to start immediately. More detailed information will be provided to interested parties.

James G. MacMillan, PE, CEM
Principal, Director of Engineering
MacMillan and Company, LLC
2926 State Road, #219
Cuyahoga Falls, Ohio 44223
216-402-3580
mac@macmillanandco.com

CLE AIChE Social Event: Oktoberfest at German Central in Parma 06Sep2024

Joe Yurko (AIChE Newsletter), Mike Galgoczy (AIChE Chair), Joe Santocildes (ASME Guest) and John Juchnowski (AIChE Young Professionals Chair)

CLE AIChE Quantum Computers at CSU, Joint Meeting with CSU AIChE Student Section and Young Professionals on 11Sep2024

Presentation by Dr. Chansu Yu, Chair of Electrical Engineering and Computer Engineering Department, Washkewicz College of Engineering, CSU

Audience of Chemical and Biomedical Engineering Master's Program Students.

Dr. Yu & Mike Galgoczy

AIChE

CANDIDATES FOR 2025 BOARD OF DIRECTORS

Election procedures are in accordance with the Bylaws, Section II.

VOTING INSTRUCTIONS

To enable members to make informed selections for the AIChE election, the candidates for President-Elect (*below*), Secretary (*page 2*), and Director (*pages 2-4*) have provided an overview of their experience, as well as plans for future programs and direction of the Institute. These messages, listed in random order, are in the candidates' own words.

You may vote for a maximum of one (1) candidate for President-Elect, one (1) candidate for Secretary, and four (4) candidates for Director. Election results will be tallied on October 1st and announced on October 28th at AIChE's Annual Meeting in San Diego.

Members have the option of utilizing an electronic proxy instead of a paper ballot. If you would rather use an electronic proxy instead of the enclosed paper ballot, please go to the proxy web site on or after **August 26th**:

AIChE.SocietyElection.com

Your membership number will serve as your personal identification number. The same rigorous standards guarding your privacy will be applied to both paper ballots and electronic proxies.

To use the enclosed paper ballot, please follow the instructions on the right. To be valid, your ballot or electronic proxy must be received by **September 30, 2024.**

1. The paper election ballot for the 2025 Board of Directors is included separately. On the ballot, fill the boxes opposite the candidates of your choice. Be sure to use a pen with blue or black ink or a dark pencil. The scanner that "reads" the ballots will not pick up other ink colors.
2. Mark boxes for the candidates you choose like this: ■ ☒

   Not like this: ☑ ⊟
3. Seal the marked ballot in the return envelope provided and write in your return address. Do not erase or cross out your **name or membership number from the back of the envelope. If** they are incorrect, please write in the correct information. This information is used for election control.
4. Ballots must be received by **September 30, 2024.** Please be sure to attach the proper postage.
5. Please do not enclose dues payments, address changes, or any other correspondence with your ballot—these items should be mailed directly to the Institute's Member Service Center (PO Box 4429, Danbury, CT 06813-4429).

NOMINATED AS PRESIDENT-ELECT FOR 2025 (and to succeed to the presidency in 2026)

Anne O'Neal

Anne O'Neal is Manager of Process Safety Culture and Competency at Chevron and an AIChE Board Member and Fellow. Her 42-year career includes several other senior positions in process safety and health, environment and safety. She also founded Chevron's early technical career development program after assignments in process engineering, operations, maintenance, strategic planning, and creating Chevron's first management system approach to process safety.

She earned her BS in chemical engineering from the Univ. of California, Davis, and was a founding member of their Center for Women in Engineering and a ChE Departmental Advisory Board member.

An early participant in AIChE's Center for Chemical Process Safety (CCPS), and a CCPS Advisory Board member since 2005, she and colleagues pioneered Process Safety Faculty Workshops which have reached 500+ globally. She also co-led the 2005 API/IPECA sustainability reporting guidelines development.

Statement: Since 1908, AIChE has provided something unique to each of us — the chance to grow as a student leader, a platform for technical advancement, a connection point for the educators of tomorrow, a home for institutional collaboration on the advancement of technology, and a cohort of talented colleagues. As President, I will strive to ensure a robust Institute serving our evolving needs as technology advances.

I remain a champion of CCPS's essential work in saving lives, protecting the environment, educating engineers, and contributing to thriving economies through the prevention of process safety incidents.

As AIChE's influence expands through CCPS, the RAPID Manufacturing Institute, the Society for Biological Engineering (SBE), and the Center for Hydrogen Safety (CHS), we must sustainably address grand challenges at scale. We serve those challenges best with the efficiency, effectiveness, and clear roles and responsibilities brought through financial health, good governance and robust policy.

I've seen first-hand the spark lit by great teaching and the vital role that ethics and risk awareness play in undergraduate engineering education. The AIChE's Foundation — through the Undergraduate Process Safety Learning Initiative — has played a critical enabling role.

While we tackle society's grand challenges, we can't ignore the barriers and headwinds society presents to encouraging and enabling engineers and scientists from all walks of life to contribute and to thrive. IDEAL is essential for our Institute in order to bring the world's best minds to solve her most challenging problems. My mother encouraged me to combine my knack for chemistry, math, and physics into ChE, an opportunity not available in her day. AIChE must play a similarly active role in transforming headwinds into tailwinds for the benefit of all.

I'm honored by this nomination and the chance to continuing to serve.

Gavin Towler

Gavin Towler is Honeywell's Chief Scientist for Sustainability. Before that he held several R&D roles including Chief Technology Officer of Honeywell UOP. He has worked in process design and clean fuels technologies for 32 years, has 77 patents, co-authored a textbook on process design, and is a Chartered Engineer, AIChE Fellow, and member of the National Academy of Engineering. Gavin has a BA and MEng from Cambridge and a PhD from the University of California, Berkeley, all in chemical engineering.

An AIChE member for 35 years, Gavin has been active in programming and leadership of the Computing and Systems Technology (CAST), Process Development, Fuels and Petrochemicals, and Management divisions. He also served on the Board of Directors (2008–10), Chemical Engineering Technology Operating Council (CTOC), Membership Committee, Foundation Board, CCPS Board, Industrial Advisory Board, and *CEP* editorial advisory board. He is a trustee of CACHE Corporation and helps teach design at the National University of Singapore.

Statement: When I first attended an AIChE meeting, I was amazed and inspired by all the problems chemical engineers were working on and the curiosity, passion, and engagement everyone had. I loved it so much that I've been coming back ever since.

We have always been a diverse and interdisciplinary profession, and AIChE mirrors that and gives us opportunities to come together to learn, share, and support each other, make new friends, and apply our skills to solving global challenges. If elected, I plan to continue the great work AIChE has been doing in expanding the diversity and inclusivity of the profession through programs such as the Future of STEM Scholars Initiative (FOSSI) and IDEAL, and creating more value and opportunities for members though initiatives like RAPID and the Institute for Learning and Innovation.

I came to the USA for grad school and was fortunate that I could make my career here. For decades, the U.S. economy and our world-class universities made the USA a magnet for talent. That's an advantage worth keeping, but recently the H-1B visa process has become overwhelmed by applications for IT workers, making it ever harder for overseas students to find work here after graduation. If elected as AIChE President, I want to engage with other professional societies and the National Academies to build a consensus for revising visa policies to make it easier to attract top talent to our schools and offer graduates a better chance of contributing their skills and diverse perspectives to the U.S. economy.

I would love to hear your ideas and concerns and you can contact me at

NOMINATED AS SECRETARY FOR THREE YEARS BEGINNING IN 2025

David J. Dixon

David J. Dixon holds the Robert L. Sandvig Professorship in the Karen M. Swindler Department of Chemical and Biological Engineering at the South Dakota School of Mines and Technology (SDSMT). He is a chemical engineer with BS/MS degrees from SDSMT and a PhD from the University of Texas at Austin. At SDSMT, he has served as: Principal Investigator for an NSF-I/UCRC BioEnergy Center; department chair, starting up a chemical and biomolecular engineering PhD program; a Fulbright Scholar, developing university-level partnerships in Germany, Mongolia, and Peru; and an instructor offering the department's first stand-alone course on process safety. David received SDSMT's 2019 Presidential Outstanding Professor Award. His research has been funded by the U.S. Department of Defense, National Science Foundation, Environmental Protection Agency, Small Business Innovative Research, and industry — in diverse areas such as protective membranes, water remediation, and applied solar energy. He has industrial process engineering experience at Dow Corning. Currently, he serves as an AIChE Board Director and is an Institute Fellow. He remains active in the Student Chapters (Chair, 2006–2007), the Career and Education Operating Council (CEOC) membership committee, and on AIChE's Chem-E-Car Competition organizing committee, where he has been involved since its inception. Dixon served as an AIChE Student Chapter advisor, a Group 4 (Education) National Program Committee chair (2004–2005), and chaired CEOC in 2020.

Statement: Through my past experiences in academia, in industry, as well as in my leadership roles within AIChE, I've learned of the many diverse areas in which our organization is involved. As an Institute, we are well positioned to help promote and contribute to strategies that can solve many of our world's challenges. If elected, I want to help AIChE continue "Doing a World of Good," through:

- strengthening its position as a global leader of chemical engineering by supporting and helping to develop AIChE's many diverse communities;
- continuing to promote enriching opportunities for young professionals and youth from all walks of life to achieve their dreams, such as the Future of STEM Scholars Initiative, K-12 outreach, and local sections; and
- helping chemical engineers to be recognized as a community that has the expertise and knowledge to address some of the world's great challenges, such as available water, sustainability, process safety, and clean energy.

I look forward to the opportunity to serve as your Institute Secretary and ask for your support. Please feel free to contact me at david.dixon@sdsmt.edu.

Julianne Holloway

Julianne Holloway is an associate professor of chemical engineering at Arizona State University (ASU). Prior to ASU, Julianne completed her BS and PhD in chemical engineering at Drexel University and her postdoctoral training at the University of Pennsylvania. She has been active in AIChE since 2006, including as the "Celebrating 20 Years of Women in Chemical Engineering" Symposium Chair, Materials Engineering and Science Division Director, and Biomaterials Area Chair. In 2020, she was elected to AIChE's Board of Directors. Her significant contributions to AIChE were recognized by the Herb Epstein Award for Technical Programming, AIChE's 35 Under 35 Award, and the John C. Chen Young Professional Leadership Scholarship. Julianne's research focuses on the development of biomaterials for tissue engineering applications. Her expertise in biomaterials has been recognized through numerous awards, including Associate Scientific Advisor for Science Translational Medicine, Emerging Scholar for the Journal of Biomedical Materials Research, and the MTF Biologics Junior Investigator Award.

Statement: My first involvement with AIChE was as an undergraduate student, where I served as the Student Chapter President. Since then, AIChE has played a critical role in my career at every stage. If elected, I will use my experiences within chemical engineering to advance AIChE's strategic plan.

- I will commit to strengthening and expanding AIChE's global reach, positioning the chemical engineering community to address and solve today's grand challenges. Towards this goal, I will work with AIChE to highlight the critical role of chemical engineers in advancing technology related to sustainability, manufacturing, and health. By augmenting our global profile, we will inspire future chemical engineers, enhance public support, and strengthen our profession.
- To address future challenges, we will need to continually adapt to meet the needs of our members and the broader society. I will seek to strengthen AIChE's role in developing new educational tools to ensure members' success and to promote lifelong learning. I will work to enhance AIChE's role as a hub to share new scientific ideas and to catalyze the development of innovative technologies, especially related to data science and artificial intelligence.
- The chemical engineering profession is stronger when we work together. I will work with AIChE to foster an inclusive community unified in "doing a world of good." Additionally, I will encourage AIChE to forge new connections, as well as strengthen existing relationships between academia, industry, and governmental agencies.

I welcome your ideas on how AIChE can shape the future of chemical engineering at julianne.holloway@asu.edu.

NOMINATED AS DIRECTOR FOR THREE YEARS BEGINNING IN 2025

Robert Y. Ofoli

Robert Y. Ofoli is an AIChE Fellow. He holds a PhD in chemical engineering (Carnegie Mellon University), a PhD in agricultural engineering (Michigan State University), and a BS in agricultural mechanization (University of Maine). He is an associate professor of chemical engineering, student chapter advisor, and Faculty Excellence Advocate for the College of Engineering at Michigan State University, with active research in plastics upcycling. His service to AIChE includes the Student Chapters Committee (Chair in 2006), Chem-E-Car Committee, Chem-E-Car Rules Committee, and member of the team that successfully revamped Chem-E-Car operations safety as requested by the AIChE Board. Robert served three terms on the Career and Education Operating Council (CEOC; 2017 Chair). He was also a member of the American Chemical Society (ACS) Joint Board-Council Committee on Publications, and a Treasurer of the ACS Colloid and Surface Chemistry Division, during which he became familiar with organizational tax-exempt 501(c)(3) regulations.

Statement: AIChE is a global organization with diverse cultures, languages, races, ethnicities, and genders. Its leadership requires a diverse set of approaches — for example, thinking "mosaic," not "melting pot;" building from the bottom up, not top down; focusing on core values (ethics, trust, transparency, professionalism); and cognizance of implicit bias.

The necessity for globally-sensitive programming is reflected in 2024 AIChE President Alan Nelson's support for several AIChE initiatives and programs: IDEAL (inclusion, diversity, equity, anti-racism, and learning); RAPID (Rapid Advancement in Process Intensification Deployment); Explorer AIChE membership for non-traditional chemical engineers; FOSSI (Future of STEM Scholars Initiative) scholarships for diversification; and the "Bee a ChemE" campaign for middle school students. Achieving these diverse goals requires dedicated efforts to broaden our global impact. When I think of the difficulty of doing this successfully, I remember Billy Jean King's assurance that "pressure is a privilege." I embrace the pressure, with the knowledge that successful solutions are not a one-person job; they require collaborating with colleagues to develop measurable metrics to assess real progress.

My goal is to use the principles of servant leadership that I depend on for complicated issues. I am committed to advancing AIChE's strategic plans by:

- enabling the success of stakeholders in chemical engineering and related professions;
- supporting IDEAL, FOSSI, and RAPID, and working to create other essential communities;
- working with Directors and Fellows to educate our national political leaders on the true value of DEI in academic institutions;
- promoting lifelong learning across the profession; and

David Klanecky

Recognized for his impressive 30+ year career in R&D, operations, and commercial and strategic leadership roles in North America, Europe, and Asia, David Klanecky brings this experience to his role as the CEO and President of Cirba Solutions, the most comprehensive and trusted battery materials and management provider. Leading the strategic growth of Cirba Solutions, Klanecky led a capital raise, securing roughly $300 million. Collaborating with the private and public sectors, David is focused on expanding operational and technology capabilities to support the growing needs of the circular battery supply chain.

David currently sits on the board of AIChE's Institute for Sustainability Board; the External Advisory Committee for the Advanced Energy Technologies Directorate of the Argonne National Laboratory; is a Board Director for NanoGraf; and is president-elect of NAATBatt International.

Statement: As a member of AIChE for more than 30 years, I currently sit on the managing board of the organization's Institute for Sustainability. It's an honor to be considered for the Institute Director role, to help further the success of critical advancements in communities through the chemical engineering profession. I want to use this platform to encourage current and future generations to play a more active role in the evolving scientific disciplines arising in the face of today's challenges.

As a society, we are undergoing a multitude of transformational changes, including electrification and the creation of sustainable supply chains. These are difficult problems to solve and cannot be accomplished in a vacuum. We need the versatile skillsets and expertise possessed by chemical engineers to be invited to the table, as they are critical collaborators and elite scientific minds that are part of providing solutions for these large societal issues.

With industries moving towards automation, we must face this challenge head-on to ensure that chemical engineers, and those entering the field, remain relevant during this transformation, and emerge at the forefront. This evolution includes enhancing academic curriculums by ensuring that students have access to real-world and hands-on experiences to promote lifelong learning, including adaptable and flexible learning styles to meet the future needs that this profession will demand.

During my 10 years spent overseas, I led organizations of differing cultural backgrounds, reenforcing the importance to me of having a diverse workforce to address the creation and strengthening of new initiatives to solve global challenges.

As Director of AIChE, I will use my leadership experience and passion to ensure

NOMINATED AS DIRECTOR FOR THREE YEARS BEGINNING IN 2025

Jerry J. Forest

Jerry Forest brings four decades of experience to his candidacy for the AIChE Board of Directors. As Senior Director of Process Safety at Celanese, he achieved a 90% reduction in process safety events over 13 years. Currently serving as a process safety improvement consultant at Jerry Forest, LLC, and as adjunct lecturer in chemical engineering process safety at Louisiana State University (LSU), Jerry's expertise is widely recognized. He holds a BS in chemical engineering and an MBA from LSU, and a master's degree in pastoral studies from Loyola. Jerry prioritizes data-driven strategic planning, intentional competency development, the fostering of a robust process safety culture, and driving excellence in conduct of operations exemplified by the creation of the acclaimed "Walk the Line" program. Certified as a Process Safety Professional and emeritus member of AIChE's Center for Chemical Process Safety (CCPS), and recognized as a Fellow of both CCPS and AIChE, Jerry Forest is uniquely positioned to contribute invaluable expertise to the AIChE Board.

Statement: Passionate about improving process safety across organizations, I am committed to reducing the severity and frequency of process safety events. My extensive engagement with CCPS, encompassing positions as a staff consultant and boot camp instructor, along with prior roles as vice chair of the CCPS planning committee, member of the technical steering committee, and active participation in 17 project committees — five of which I chaired — underscores my commitment to CCPS and AIChE.

As past chair of AIChE's Process Safety Division (PSD), I led a multi-year endeavor to survey members, creating a value proposition, bylaws update, and name change from Safety and Health Division to Process Safety Division — aligning PSD's objectives with AIChE committees and projects. This includes the first IDEAL gap assessment aligned with AIChE. My passion for process safety is evident in my projects that have had national and global impacts, such as Walk the Line, a conduct-of-operations model addressing human factor incident causes; and Process Safety in Academia, a network of university professors teaching process safety that was created to help them learn from each other.

As an AIChE Board Director, I am committed to furthering the organization's aspiration of "Doing a World of Good." My focus areas include championing initiatives through the PSD, CCPS, AIChE Academy, and the Global Congress on Process Safety to realize a "world without process safety incidents" by addressing human factor incident causes and enhancing conduct of operations. Additionally, I am dedicated to promoting lifelong professional and personal learning, particularly among student and early career chemical engineers.

Frank van Lier

Frank van Lier was Global Senior Director of Process Technology for The Lubrizol Corporation, retiring in 2022 with 40+ years industrial experience across R&D, operations, and technology. His experience included numerous leadership roles at Lubrizol's Ohio and Texas plants and a year as the General Manager of Lubrizol's Zhuhai, China, manufacturing facility (2018). He also spent six years on the board of the Lubrizol/Indian Oil joint venture located in Mumbai, India. Frank earned a BSChE from the University of Cincinnati and an MBA from Case Western Reserve University.

An AIChE Fellow, Frank has been a member of AIChE since 1980. Most recently, he was on the inaugural governing board of AIChE's RAPID Manufacturing Institute, acting as Chair in 2022. He also chaired the Chemical Engineering Technology Operating Council (CTOC; 2015) and was a director and Chair of the Management Division. Current activities include service as a reviewer for the Virtual Technician and Operator Training Program (VTOP) being developed by AIChE's Institute for Learning and Innovations, and continued engagement with the Management Division.

Statement: My hopes for AIChE are to continue to build on the successes of the past. I see RAPID and the Center for Chemical Process Safety (CCPS) as key examples of successful efforts to engage chemical engineers from across industries. RAPID has created valuable industry and academia collaborations focused on more sustainable, safer, and more economical manufacture as exemplified by the successful implementation of process intensification projects at Lubrizol plants in close collaboration with the University of Pittsburgh. The next five years of RAPID are all about shifting to a more sustainable model while still delivering value to AIChE members and their organizations.

Continuing to improve and add member value through AIChE's education efforts will lead to expanded membership and increased corporate engagement if members can cost effectively learn from experts in the field.

The number of AIChE technical divisions, forums, and technology groups can make it confusing for even veteran members to navigate the massive volume of offerings. Opportunities to continuously improve targeted communications are critical to keeping members engaged and attracting new members.

The above are the areas I've supported in the past and intend to support as a director of the Institute. We need to continue to build the network of engineers and encourage/engage with the younger and more diverse cohorts to bring out the best in all as part of AIChE's mission to build an inclusive community united in "doing a world of good."

I am honored to be a nominee for the AIChE Board of Directors and ask for your support.

Raymond Rooks

Raymond Rooks is a principal engineer at AVN Corporation, where he develops new chemical processes, and designs and operates process separation systems, in particular distillation systems, for a range of clients and chemistries. Before AVN, he spent 14 years at Praxair/Linde in cryogenic technology, working in process development, technology management, and competitive analysis. He also spent eight years at Union Carbide/Dow Chemical in process separations. He has given presentations and published several articles in process development and distillation. Within AIChE, he has been a member and served in the leadership of the Process Development Division for 25 years. He is also a member of the Chemical Engineering Technology Operating Council (CTOC), and last year was elected an AIChE Fellow.

Statement: Chemical engineering as a profession is experiencing a declining workforce as engineers retire and other professions compete for the best students. Personal interactions with students have shown that they have a strong desire to make an impact in the world and drive us to a greener and more sustainable world. Chemical engineering is a critical element in a sustainable future, but many students don't have exposure to the profession.

AIChE's greatest strength — the interactions of its members and the building of communities — is a key part of our strategic plan. These are realized in AIChE's IDEAL Path, the Process Engineering Community, technical divisions, student chapters, local sections, etc. AIChE has a unique opportunity to be more central to the needs of its members. Different communities have difficulty interacting with each other. This is particularly true among younger members. Ad hoc approaches can be valuable, but bringing members together can be the core of what we do, helping to highlight the value of AIChE.

AIChE's web platform provides a great starting point for integrating our diverse communities. By focusing on building connections, an expanded AIChE digital ecosystem will allow our diverse communities to easily connect, find resources, and for members to highlight their professional profile.

Increased interactions between communities will play an outsized role in strengthening our organization. New initiatives, such as the "Bee A ChemE" program, are an example of engaging our numerous student chapters to excite middle school students about our profession. More of this is needed, even after someone has decided to pursue chemical engineering.

My focus will be to strengthen interactions throughout the Institute as I believe it's

Stephen P. (Steve) Beaudoin

Stephen P. (Steve) Beaudoin is Professor in Purdue's Davidson School of Chemical Engineering. He is Founding Director of the Purdue Energetics Research Center (PERC), where he directs multiple DoD-sponsored research centers focused on explosives and propellant engineering. He is also Founding Academic Director of a novel online Master's degree program focused on defense and security that serves three U.S. Navy bases. Beaudoin was the 2021–2022 Chair of the Purdue University Senate, and has served Purdue as Interim Associate Vice Provost for Student Affairs. He has chaired multiple sessions at AIChE's regional and Annual meetings and has been a mentor at the AIChE Young Faculty Workshop. He has published more than 100 refereed articles, has made ~200 technical presentations, and has received the NSF Early Career Faculty Research Award as well as numerous teaching and mentoring awards. He earned his BS from the Massachusetts Institute of Technology (1988), his MS from the University of Texas at Austin (1990), and his PhD from North Carolina State University (1995), all in chemical engineering.

Statement: As a Board member, I would encourage the Institute to pursue workforce development activities that bring more engineers into our profession and help existing professionals to enhance their skills. I have substantial experience with workforce educational programs through an MS degree program that I direct and through a program I am developing at a local community college to train operators to work in chemical facilities. I would encourage the use of the AIChE Institute for Learning and Innovation (ILI) construct to review emerging industrial needs against the classical chemical engineering curriculum to find ways to address such needs without sacrificing valuable outcomes.

We learned from the COVID pandemic that educational and professional activities can be successful when executed remotely. I would encourage activity within the AIChE Academy to develop more asynchronous, remote educational content leading to short course or university credits (including certificates) in key topic areas. The certificates could be stackable to form advanced degrees, and this would provide maximum flexibility as our stakeholders pursue their lifelong learning needs. To develop more engineering talent, it is also important to create compelling educational content for junior and senior high schools. This can inspire students to prepare themselves to succeed in university chemical engineering programs — which is important in general but especially so for schools in diverse communities where there may be few existing chemical engineering role models.

If elected to the Board of Directors, I will help AIChE to remain the leading international voice in the chemical and related engineering professions by promoting new partnerships and activities such as these that help us to be responsive to the needs of our stakeholders and society.

NOMINATED AS DIRECTOR FOR THREE YEARS BEGINNING IN 2025

Luke Landherr

Luke Landherr is a College of Engineering Distinguished Teaching Professor and Associate Chair of Undergraduate Studies in the Chemical Engineering Department at Northeastern University. He received his BS from Lafayette College and his PhD at Cornell University, before completing an NRC postdoctoral fellowship at the National Institute of Standards and Technology.

His NSF-funded research into comics and videos as visual learning tools for students has enabled him to create groundbreaking educational tools. These materials have been used at universities and high schools throughout the U.S. and internationally, including the "Wide World of Chemical Engineering" comic and the *Crash Course: Engineering* series with PBS Digital. He is a regular contributor and Publication Board member for the *Chemical Engineering Education* journal. He was named one of AIChE's 35-Under-35 in 2017 and has won AIChE and American Society for Engineering Education (ASEE) awards for his educational research and teaching, including AIChE's awards for Excellence in Engineering Education Research and for Innovation in Chemical Engineering Education.

Statement: I am honored to be nominated for AIChE's Board of Directors, and to have the oppoetunity to represent our discipline, colleagues, and students in this capacity. I have extensive leadership experience within AIChE, having served as Chair of both the Societal Impact Operating Council (SIOC) and AIChE's K-12 Committee, as well as Director for AIChE's Education Division. Through these roles, I helped found and organize the K-12 STEM Showcase at the Annual Meeting starting in 2019, and helped build AIChE's K-12 Community — now with several thousand members. I also served as Programming Co-chair for the 2021 Annual Meeting.

I strongly believe in AIChE's aspiration to provide leadership to our field and promote lifelong growth in chemical engineering. If elected, I aim to further the impact of the Institute through:

- creating and expanding programs, outreach, training, and initiatives that will increase growth in our profession and attract new generations of chemical engineers;
- promoting policies that enable innovative research and technology so that chemical engineers can continue to be leaders in medicine, sustainability, materials, and the many other fields that make up our discipline;
- improving communication and highlighting the achievements of chemical engineers both within our profession and beyond, to better engage members and support growth efforts;
- upholding the IDEAL path by helping to build an inclusive community where all members are empowered to contribute to and strengthen our profession.

I welcome your feedback and any dialogue about how I can best serve you on the AIChE Board at l.landherr@northeastern.edu.

Akua Asa-Awuku

Akua Asa-Awuku is currently a professor of chemical and biomolecular engineering and the Associate Dean for Diversity, Equity and Inclusion in the A. James Clark School of Engineering and Professor at the University of Maryland, College Park. She received her BS (2003) in chemical engineering from the Massachusetts Institute of Technology, and her MS (2006) and PhD (2008) in chemical engineering from the Georgia Institute of Technology. Dr. Asa-Awuku's primary research explores and predicts the fate and transport of aerosols and droplets in the environment, and their interactions with water as they pertain to air quality, climate, and health. Her work as an engineer, teacher, and leader is deeply rooted in chemical engineering principles, and during her career she has worked with academic, industry, and community partners to address some of the most pressing environmental and atmospheric challenges of our time. She currently has more than 70 publications and is a recipient of research grants from the U.S. National Science Foundation, the Environmental Protection Agency, and the Department of Energy.

Statement: I am deeply honored to have the opportunity to serve, and I am enthusiastic about leveraging my leadership skills and technical expertise to make meaningful contributions to the AIChE Board of Directors. I first became a member of AIChE in graduate school, and my passion and dedication to our field of chemical engineering have only grown stronger over the years. I firmly believe that our discipline represents a distinctive intersection of science, innovation, and real-world application with the potential to address pressing global challenges through technological advancements and chemically sustainable solutions.

My prior and current experiences have shaped my perspectives and are well-aligned with the current AIChE strategic plan. I am the former President of the American Association for Aerosol Research and currently sit on external advisory boards for the National Center for Atmospheric Research, Pacific Northwest National Laboratory, and Georgia Tech. My work in climate and environmental justice research via a chemical engineering lens has helped to expand our profession's ability to address important societal issues and maintaining relevance in today's evolving world requires ongoing engagement with the public, industries, and government. Additionally, the opportunity to continually learn and adapt in our dynamic and impactful discipline fuels my enthusiasm to serve. I will strive to bring fresh, innovative perspectives, to invigorate discussion, inspire creative problem-solving, and drive strategic decision-making for the board of directors. In closing, I encourage all members to keep this dialogue going in ways to foster growth and future impact in our chemical engineering discipline.

Please feel free to email me with any further ideas or questions you may have: asaawuku@umd.edu.

INCUMBENTS

President-Elect
(to serve as President in 2025)
Joseph D. Smith

Missouri University of Science and Technology
Chief Technology Officer,
Elevated Analytics Consulting

Treasurer
(Second Year of a Three-Year Term)
Ana P. Davis

Head of Health, Safety, and Environment
in North America
Syngenta

Please join me and vote for your favorite candidate for AIChE Election in 2025! Also, note that a local CLE AIChE member is running for office. Voting begins August 26th and ends September 30th. For reference, please go to:

[2024 AIChE Board Election for the 2025 Board| AIChE]

AIChE Election Ballot

President-Elect (Please vote for one)

- ☐ Anne O'Neal
- ☐ Gavin Towler

Secretary (Please vote for one)

- ☐ David J. Dixon
- ☐ Julianne Holloway

Director (Please vote for four)

- ☐ Robert Y. Ofoli
- ☐ David Klanecky
- ☐ Jerry J. Forest
- ☐ Frank van Lier
- ☐ Raymond Rooks
- ☐ Stephen P. (Steve) Beaudoin
- ☐ Luke Landherr
- ☐ Akua Asa-Awuku

To be counted valid, ballots must be received by **September 30, 2024.**

To use an electronic proxy instead of this paper ballot, please visit:

AIChE.SocietyElection.com

on or after August 26, 2024.

Thank you for voting.

Article from C&EN, Chemical & Engineering News, American Chemical Society Magazine, July 28, 2024, page 13:

"EPA awards $4.3 billion to climate change projects

Grants will fund decarbonization efforts across the US"

By Craig Bettenhausen

https://cen.acs.org/environment/climate-change/US-Environmental-Protection-Agency-awards/102/i23

The US Environmental Protection Agency awarded $4.3 billion from its Climate Pollution Reduction Grants program on July 22. The money will help implement 25 projects across the country that aim to reduce greenhouse gas emissions and air pollution.

Many of the selected projects will use chemistry and materials science to cut carbon emissions, with the biggest areas being energy, transportation, and agriculture. Alaska and New England, for example, will get a total of around $490 million for electric heat pumps to replace residential oil- or gas-fired furnaces. At least seven projects support electrification of passenger or freight vehicles, and seven more involve climate-smart farming or habitat restoration.

Some of the projects include resilience components to insulate communities and business from extreme weather events brought on by climate change. "Today, my Administration is empowering local communities across 30 states to cut pollution and fight the climate crisis—from curbing greenhouse gas emissions in Pennsylvania to flood-proofing infrastructure in North Carolina," President Joe Biden says in a statement.

The projects include three plans to reduce methane emissions, from landfills, mines, and petroleum production. In a separate funding opportunity open until Aug. 26, the administration is offering $850 million in financial and technical support to companies and other stakeholders to cut methane emissions in the oil and gas sector. Both programs deploy funds from the Inflation Reduction Act of 2022…

Article from C&EN, Chemical & Engineering News, American Chemical Society Magazine, July 28, 2024, page 27:

"Electronic waste is a gold mine waiting to be tapped"

This fast-rising waste stream contains billions of dollars' worth of metals, and start-ups are seeking efficient, sustainable ways to recover that treasure

By Prachi Patel

https://cen.acs.org/environment/recycling/Electronic-waste-gold-mine-waiting/102/i23

The world is drowning in electronic waste. The flood of e-waste we generated in 2022 contained $91 billion worth of valuable metals, according to a recent United Nations report. Almost 40% of those metals ended up in a landfill, were burned in incinerators, or were disposed of in uncontrolled ways. A mere 4% of some metals essential for clean energy were recovered from e-waste. Mining these same metals, as well as improperly recycling used electronics, causes pollution and human health hazards. Current recycling processes require high temperatures and harsh chemicals. Several researchers and companies are advancing economical, sustainable methods to recover more key metals from e-waste. These approaches could help facilitate a secure, circular supply of these materials.

In the dark corners of your attic shelves or the depths of your desk drawers likely sits a collection of defunct laptops, cameras, and gaming consoles. The phone you may be reading this on will probably join that junk pile once it becomes obsolete or its screen cracks.

The average person in the US threw away 21 kg of electronics in 2022, while the average person in Norway—the country with the highest per-capita e-waste—threw away 27 kg. Those numbers are close to the weight range of a pit bull, and the numbers add up. Globally, people discarded a record 62 million metric tons (t) of electronics, according to the United Nations' recent *Global E-waste Monitor 2024* report. That's the weight of over 1.7 million fully loaded semitrailer trucks, which, if lined up bumper to bumper, would reach almost around the equator.

And that trash contains treasure. Metals made up half the world's electronic trash, or e-waste, in 2022 and were worth $91 billion. Copper, iron, and gold accounted for a big chunk of that value. E-waste also contains aluminum, platinum, and rare earth elements such as neodymium, which are critical for the batteries and wind turbines needed to transition the world to green energy.

Mining these metals destroys habitats, pollutes soil and water, produces heaps of waste, and is linked to human rights abuses. Plus, the global supply of some metals is geopolitically shaky. Using urban mining—the recovery of materials from waste—to reclaim valuable metals from e-waste would alleviate these issues. It would enable the circular use of materials and help meet demand for critical metals. It would also prevent the emission of 52 million t of mining-related greenhouse gases…

Article from C&EN, Chemical & Engineering News, American Chemical Society Magazine, July 1, 2024, page 4:

"The next generation of genome editing is making big changes to DNA"

Using bridge RNA, scientists can induce large insertions, deletions, and rearrangements in a genome

By Max Barnhart

https://cen.acs.org/biological-chemistry/gene-editing/next-generation-genome-editing-making/102/i20

The discovery of CRISPR-Cas9's gene-editing prowess revolutionized genetic engineering just over a decade ago. Now it appears that genetic engineering technology may be taking its next big leap.

Two papers published in *Nature* on June 26 detail how bridge RNA adapted from a transposable element can induce large-scale, genomic changes at programmable and site-specific locations within a genome. Whereas CRISPR is best at making small, targeted modifications to a genome, bridge RNA gives genetic engineers a power they've never had before—to add, remove, invert, or rearrange large segments of DNA almost anywhere they want (DOI: 10.1038/s41586-024-07552-4 and 10.1038/s41586-024-07570-2).

Patrick Hsu, a bioengineer at the University of California, Berkeley, who led the research, calls bridge RNA the third generation of genetic engineering technology, after RNA interference and CRISPR. "It takes us beyond the DNA- and RNA-cutting abilities of CRISPR and RNA interference towards a broader suite of capabilities for the field of genome design," he says.

That's a strong claim, but one that other experts agree with. Yen-Ho Chen, a plant genome engineer working in industry, says, "It reminds me of when CRISPR was discovered. It's novel, programmable, and you can tune this tool to adapt it for different applications. I think that part is potentially better than what we have right now in CRISPR-Cas9."

The origin of the bridge RNA technique helps explain how it stands apart from RNA interference and CRISPR and is able to make these large genome modifications. Hsu and colleagues discovered bridge RNA when they were studying a transposable element in bacterial DNA called IS110. This genetic chunk can jump around the genome by cutting itself out of one spot and pasting itself in another.

IS110 produces a recombinase protein and expresses a noncoding RNA. The team found that the noncoding RNA contained two loops, a donor loop that could recognize IS110's own DNA, and a target loop able to recognize DNA at an insertion site somewhere in the genome. When the RNA inside each loop bound to its respective DNA sequence, it formed a bridge, linking the DNA sequences together so that the recombinase protein could seamlessly merge them…

Article from C&EN, Chemical & Engineering News, American Chemical Society Magazine, July 1, 2024, page 7:

"Storing DNA in an amber-like polymer, *Jurassic Park*–style"

Tough, degradable material provides efficient room-temperature DNA storage for genomics and digital data

By Prachi Patel

https://cen.acs.org/biological-chemistry/dna/Storing-DNA-amber-like-polymer/102/web/2024/06

In the blockbuster film *Jurassic Park*, scientists resurrect dinosaurs by extracting DNA that's been preserved in amber for millions of years. Inspired by such natural preservation, researchers have created glassy polymers that store DNA at room temperature and dissolve when needed to release the molecules (*J. Am. Chem. Soc.* 2024, DOI: 10.1021/jacs.4c01925). The method, dubbed thermoset-reinforced xeropreservation (T-REX), is a step toward low-cost data storage in DNA.

Computer memory devices process information as strings of zeros and ones. Those binary data could be encoded in the same four nucleotides—A, G, C, and T—that encrypt genetic information in DNA molecules. Scientists have proposed DNA as a data storage medium because it is dense: a coffee mug full of DNA could store all the world's data.

But DNA decays in days at room temperature, so it is stored today at cryogenic temperatures, which requires energy and special equipment. "If I wanted to send DNA on a mission to Mars or collect samples in rural Africa, that's not going to work," says James Banal, cofounder of Cache DNA, which is developing a new biomolecule storage technology. For room-temperature storage, he and others have previously encapsulated DNA in silica particles and calcium phosphate crystals. This process takes days because water-loving DNA needs to be dissolved in organic solvents using surfactants, which are then removed via drying.

So he, Massachusetts Institute of Technology chemist Jeremiah A. Johnson, and colleagues devised a way to trap DNA in hours, using a hard polystyrene-based thermoset polymer. Thermosets, with their cross-linked polymer networks, are tough and resistant to chemicals. The researchers added small thionolactone sections to the network that can be cut with a cysteamine reagent.

The team made special polycation molecules composed of a water-loving side and an oily water-repellent one. Charges on the molecule bound to DNA and quickly transferred it from water to a solvent containing styrene monomers. Heating the solution created a glassy polymer block containing DNA. The material preserved DNA 10 times as long as silica particles could. Adding cysteamine disintegrated the polymer so the researchers could separate the DNA…

Article from C&EN, Chemical & Engineering News, American Chemical Society Magazine, July 1, 2024, page 10:

“Lilly partners with OpenAI to develop novel antibiotics

The partnership is the latest example of recruiting artificial intelligence in the fight against antimicrobial resistance

By *Aayushi Pratap*

https://cen.acs.org/policy/global-health/Lilly-partners-OpenAI-develop-novel/102/i20

Eli Lilly and Company has partnered with OpenAI, maker of the generative AI platform ChatGPT, to invent new antibiotics.

Lilly says antimicrobial resistance (AMR) affects countries in all regions and at all income levels. But it is exacerbated by poverty and inequality, particularly in low- and middle-income countries.

The Indiana-based drug company says the collaboration supports its earlier commitment, through its Social Impact Venture Capital Portfolio, of $100 million to the industry-backed AMR Action Fund. Lilly says the action fund aims to provide patients with two to four new antibiotics by 2030.

According to the World Health Organization, 4.95 million deaths yearly are associated with AMR.

This year, OpenAI also partnered with Sanofi and Formation Bio to build AI-powered software for drug development.

James Zou, associate professor of biomedical data science at Stanford University, calls the Lilly-OpenAI partnership an exciting development for drug discovery. “OpenAI is increasingly interested in biotech, specifically new drug discovery,” Zou says. “I believe that generative AI will play a very important role in discovering new molecules.”

Academic research groups such as Zou’s use generative AI more and more to synthesize new antibiotics. This year, Zou’s team and McMaster University researchers reported a new model called SyntheMol, which can spell out chemical recipes for antibiotic molecules (*Nature*, DOI: 10.1038/s42256-024-00809-7). Using the platform, the authors shortlisted six novel antibiotics capable of killing drug-resistant strains of *Acinetobacter baumannii*.

Another study, published in *Nature* last December by researchers from the Massachusetts Institute of Technology, highlighted AI’s power in drug discovery (DOI: 10.1038/s41586-023-06887-8). The team used deep learning to identify antibiotic compounds that kill methicillin-resistant *Staphylococcus aureus*…

Article from C&EN, Chemical & Engineering News, American Chemical Society Magazine, July 1, 2024, page 23:

"Chemistry's image is harming talent acquisition"

The opportunities in chemical industry are vast, but many aren't aware of them

By Amelia Greene, special to C&EN

https://cen.acs.org/policy/regulation/Chemistrys-image-harming-talent-acquisition/102/i20

"Do you feel guilty?" the woman at a networking event asked me. "Guilty about what?" I replied. "What your company is doing to the environment," she answered with exasperation. We were in New York City, and after the woman I was talking with had mentioned she worked in finance, I had replied that I worked in the chemical industry. That was enough to prompt her ire.

What about all the good things we're doing? The chemical industry is spearheading the switch away from fossil fuels, it played a pivotal role in fighting COVID-19, and it ensures a constant viable food supply. The interaction was telling, and I had a major realization: the chemical industry has a massive marketing problem.

I've heard countless stories from individuals about the head-scratching responses they get after telling others that they work in the chemical industry. The general population has no idea how vital chemistry is to everyday life. Our industry remains largely hidden from the public, and most individuals don't realize how often they are interacting with chemistry or the by-products of chemistry in their daily lives.

Our industry is most known for unfortunate and heartbreaking crises, including plant explosions and events that contaminate common resources. The public doesn't know what the chemical industry's purpose is, and worse, they believe it only detracts from society. But the work our industry does is important to the future of humankind. This fundamental information asymmetry between the chemical industry's positive impact on our world and the public's lack of awareness continues to hurt our industry.

Today, the public continues to view the chemical industry as a net negative for society. That negative perception hinders the industry's progress in countless ways, including inferior investment from capital markets and oppressive regulation. That negative perception also hurts the chemical industry's capacity to attract talent. As our industry tackles existential threats of the future, including food and water scarcity, climate change, and future pandemics, it is imperative that we are attracting the brightest minds.

In academia, opportunities in the commercial chemical industry are also not made visible to students. At Women in Chemicals, the nonprofit I cofounded, women echo this sentiment on our podcast, Woman of the Week. The overwhelming majority of women we interview say they stumbled into the industry unintentionally, and we seldom hear that a woman sought out our industry for career opportunities. This is a huge disadvantage for our talent pool…

Article from C&EN, Chemical & Engineering News, American Chemical Society Magazine, July 1, 2024, page 27:

"Getting PFAS out of drinking water"

After the unwanted chemicals are removed, disposal is the next challenge

By Britt E. Erickson
https://cen.acs.org/environment/persistent-pollutants/Getting-PFAS-drinking-water/102/i20

Public water utilities in the US are facing a 5-year deadline to meet low parts-per-trillion limits for six per- and polyfluoroalkyl substances (PFAS) in drinking water. The Environmental Protection Agency estimates that thousands of water systems will need to install advanced treatment processes to meet the limits. Utilities are eyeing several technologies to remove PFAS, including ion-exchange resins, granular activated carbon, and plant-based sorbents. But eventually they will need to replace such media, and what to do with the PFAS-laden spent media becomes the next challenge. Sustainability goals, concerns about liability related to PFAS in waste, and potential supply chain issues from soaring demand for PFAS removal media are pushing companies to develop methods for regenerating spent media and destroying the PFAS. But it's unclear how water utilities will pay for technology to remove PFAS from their drinking water, as well as what the cost of replacing and disposing of media will be.

When scientists discovered three per- and polyfluoroalkyl substances (PFAS) at worrisome levels in the drinking water provided to about 450 people in rural Maysville, North Carolina, town officials sprang into action. It was 2019, and at the time, there were no guidelines or federal limits for PFAS in drinking water. Still, town leaders immediately shut down the water plant and began purchasing water from a facility in neighboring Jones County.

Five years later, Maysville is now preparing to reopen its water plant thanks to about $1 million in federal grant money. The town used the funds to install a filtration system that can remove PFAS, including both long- and short-chain compounds.

Long-chain PFAS are those with eight or more carbons, such as the commonly found and toxic perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). Short-chain PFAS have four to seven carbons. Maysville is dealing with PFOA, PFOS, and perfluorohexanesulfonic acid in its water.

To remove all three PFAS, the town chose a system that uses both granular activated carbon (GAC) and ion-exchange resins. The water treatment services firm ECT2 designed and installed the technology.

Surrounded by fields of tobacco, soybeans, and corn, Maysville is not the kind of place one would expect to find such advanced water treatment technology. Many businesses on the main street are shuttered. The municipal building sits across the street from a Piggly Wiggly grocery store and Hardee's fast-food restaurant. Visitors passing through the town on their way to coastal vacation spots might easily miss it.

But Maysville is one of the lucky towns that identified PFAS in its drinking water and secured grants to address the problem before the US Environmental Protection Agency set limits. The agency issued the stringent, low parts-per-trillion limits for six PFAS in drinking water in April, giving public water utilities 5 years to meet them. Now, tens of thousands of utilities big and small will be competing for government money to tackle the problem…

Article from C&EN, Chemical & Engineering News, American Chemical Society Magazine, July 19, 2024, page 22:

"C&EN's Global Top 50 chemical firms for 2024"
Mounting challenges pushed the industry into a downturn

By Alexander H. Tullo
https://cen.acs.org/business/finance/CENs-Global-Top-50-2024/102/i22

C&EN's Global Top 50 ranking has always been a snapshot of the world's largest and most influential chemical makers. It captures the rise of some firms relative to others based on ambitious expansions, acquisitions, and the fortunes of the sectors they serve.

And because most of the largest chemical companies operate globally, the Global Top 50 is also a good check on the health of the industry. For 2023, the fiscal year on which the survey is based, the diagnosis is that the world's chemical sector experienced a downturn.

The combined chemical sales of the top 50 firms declined by 10.7% during 2023, to $1,036 billion. The year before, the Global Top 50 posted a 17% increase in sales. But the COVID-19 rebound that buoyed the 2022 increase waned last year, and an inventory correction that undermined sales volumes, and overcapacity caught up to the industry.

Combined profits for the 38 firms reporting such figures tumbled by 44.1% from 2022, to $54.4 billion. Twenty-nine of the firms posted declines in their bottom lines; 7 lost money.

It was a bad year. It was particularly bad for European firms, which have been suffering from a lack of competitiveness due to high energy costs and an aging fleet of assets. Europe's severing of ties with Russia after the invasion of Ukraine cut the industry off from an abundant supply of natural gas and exacerbated the sector's weakness. European companies like BASF, Ineos, Covestro, Arkema, and Evonik Industries posted sharp declines in chemical sales. Many firms operating in the region are cutting costs or shutting inefficient capacity.

The petrochemical sector is facing its own downturn, primarily driven by new capacity in China and the US. Declines in chemical sales and profits at Dow, ExxonMobil, LyondellBasell Industries, Indorama Ventures, and Braskem reflect that. Fertilizer prices have come down from their highs in 2022, causing results to tumble at firms like Mosaic, Nutrien, and Yara.

The industry is in a state of flux. The biggest structural change by far to the sector in recent years is the rise of several Chinese petrochemical producers. Rongsheng Petrochemical, Hengli Petrochemical, and Wanhua Chemical Group rose in the ranking because of additional revenues garnered from big recent plant expansions.

Article from C&EN, Chemical & Engineering News, American Chemical Society Magazine, August 5, 2024, page 31:

"Sickle cell disease in India: The quest for a cure"

Currently approved gene therapies are out of reach, but research efforts in the country offer a glimmer of hope

By Priyanka Runwal

https://cen.acs.org/pharmaceuticals/gene-therapy/Sickle-cell-disease-India-quest/102/i24

India has one of the highest prevalences of sickle cell disease in the world, and many of those affected are people from tribal communities and other historically disadvantaged groups. Recently approved gene therapies for sickle cell disease are an exciting new treatment option, but their price tags mean they are out of reach for health-care systems and individuals in lower- and middle-income countries. Researchers in India are now trying to develop similar gene therapies locally to serve people with severe sickle cell disease.

Saritee Sanodiya, 26, has spent countless days wondering if she'll ever live a "normal" life. Growing up, Sanodiya often missed school, frequenting the hospital for sudden, life-threatening drops in her hemoglobin levels and excruciating pain in her joints. High fever, severe headache, extreme fatigue, and difficulty breathing often accompanied these crises, which lasted days—occasionally weeks. "It would come out of nowhere," she says. "The pain is hard to describe, but it's unbearable. Sometimes you lose the desire to live."

In hospitals, doctors would treat the anemia with blood transfusions and prescribe painkillers to relieve the acute body aches. The symptoms would subside, but within months, they would come roaring back.

In the hope that someone could find and fix the problem, Sanodiya's mother took her to different doctors in and around their village of Jamuniya in the central Indian state of Madhya Pradesh, to no avail. The crises continued into Sanodiya's adolescence, and they were often preceded by jaundice—a condition easily recognized by the yellowing of the skin and whites of the eyes.

Finally, in 2018, an answer came. The anemia and medical history prompted an obstetrician to order a blood test for sickle cell disease during Sanodiya's first pregnancy checkup. The test turned up positive, meaning a genetic mutation was causing her body to produce several crescent-shaped red blood cells in addition to the normal, round ones. But the disease was a surprise to Sanodiya. "I'd never heard of it," she says.

The deformed cells in sickle cell disease are stiff and sticky and can clog tiny arteries and veins. They block the flow of blood—and thus oxygen—to various parts of the body, causing debilitating pain and progressive damage to organs including the brain, liver, kidneys, heart, lungs, and joints. And unlike normal blood cells, which have a lifespan of about 120 days, sickle cells die within 10–20 days.

When fewer blood cells circulate, anemia prevails. Meanwhile, the liver's blood filtration capabilities struggle to keep pace with the volume of dying sickle cells. A breakdown by-product—bilirubin—begins to build up and cause jaundice.

In 2023, US and UK regulators approved two gene therapies for treating sickle cell disease—the first of their kind for this disorder. While they have side effects and potential risks, the outcomes seem promising so far, says Alexis Thompson, the chief of the Division of Hematology at the Children's Hospital of Philadelphia. But a price tag of as much as $3 million per patient makes these treatments unaffordable for most people or health-care systems in the world.

Molecular biologist Debojyoti Chakraborty is codeveloping a gene therapy for people with severe sickle cell disease.

In a quest to make such revolutionary therapies accessible to people with sickle cell disease in India, research teams in the country are trying to develop the technology locally. They want to serve a population that experiences one of the highest prevalences of this disease in the world but that wasn't represented in the clinical trials for the recently approved gene therapies. The teams also hope to make these treatments available at much lower costs.

Article from C&EN, Chemical & Engineering News, American Chemical Society Magazine, August 23, 2024, page 23:

"Can Europe's chemical industry survive net zero?"

The burden of cutting greenhouse gas emissions could diminish Europe's role as a global chemical leader

By Alex Scott

https://cen.acs.org/environment/greenhouse-gases/Europes-chemical-industry-survive-net/102/i26

Europe's chemical industry is facing an existential crisis. It may not be able to raise the hundreds of billions of dollars that the region's sector will require to transition to zero greenhouse gas emissions by 2050. Small-scale studies show that some European chemical companies may already be falling behind on their commitments. Part of the problem is that Europe's supply of renewable energy is not growing fast enough to meet the chemical industry's demands. If Europe's chemical sector is to survive intact, industry experts say, it will need substantial subsidies from European governments.

About 5 years ago, most of the world's biggest chemical companies updated or reset their goals for reducing greenhouse gas (GHG) emissions to a simple but compelling target: net zero by 2050. Executives at companies from across Asia, Europe, and the US congratulated themselves on setting a goal that was more ambitious than the partial reductions they had targeted in earlier plans.

But for firms in Europe, the calculus is already starting to change. Europe has the strictest regulations when it comes to GHG emission reductions. European chemical companies also have the highest costs and the least profits to pay for the technology upgrades needed for zero- carbon production.

An additional challenge for European chemical firms is that they are struggling to access the volumes of affordable renewable energy and green hydrogen that a net-zero transition requires. Even if Europe's chemical industry succeeds, it remains unclear whether companies can compete on the world stage by selling expensive net-zero chemicals when no other region's industry is.

Key levers that the global chemical industry can pull to transition to net zero are replacing fossil fuels with renewable energy; substituting fossil fuels as a raw material with recycled material, biomaterial, or green hydrogen; and adopting low-energy- consuming electrochemical, catalytic, and fermentation processes. Carbon capture, utilization, and storage (CCUS)—although not yet proved at scale—can also help chemical firms transition to net zero.

"Europe is at a point where it has to decide whether a major chemical industry making commodity products through to specialty chemicals can be supported," says Bernd Elser, global head of chemicals for the

consulting firm Accenture. He says the sector's survival requires government support as well as alignment with equipment manufacturers, the renewable energy sector, the green hydrogen sector, and others.

"Companies around the world, including those in Japan, Middle East, and the US, are also in the process of reducing their greenhouse gas emissions, but they might not face the same ambitious green agenda as companies in the European Union," Elser says.

Among European chemical firms, commodity petrochemical producers are affected most by the transition to net zero. This is because the carbon footprints of key petrochemicals, including ammonia and ethylene, account for 80% of all emissions the chemical sector generates, Elser says.

Direct emissions—often referred to as scope 1 emissions—from the global petrochemical industry were 1.8 giga–metric tons of carbon dioxide equivalents ($GtCO_2e$) in 2020, or about 4% of all anthropogenic GHG emissions, according to a study by Lund University.

Scope 2 emissions—those resulting from the petrochemical industry's use of energy—and scope 3 emissions—those resulting from the downstream use of petrochemicals—accounted for an additional 3.8 $GtCO_2e$. The EU is responsible for about 5% of the petrochemical industry's emissions, according to the study.

The EU is committed to transitioning all industry in the region to net-zero emissions by 2050 to help keep the average global temperature rise to 1.5 °C above preindustrial levels—beyond which climate scientists forecast the world would face a greater risk of catastrophic effects from climate change. But there is a problem. Some European chemical companies are not on a trajectory to reach net zero by 2050.

Article from C&EN, Chemical & Engineering News, American Chemical Society Magazine, August 29, 2024, page 22:

"How is coffee decaffeinated, and is it safe to drink?"

Methylene chloride is the most popular decaffeinating solvent, and some consumers are concerned

By Krystal Vasquez

https://cen.acs.org/food/food-science/coffee-decaffeinated-safe-drink/102/i27

According to the National Coffee Association, only 10% of adults in the US drink decaffeinated coffee daily. Recent regulation passed by the US Environmental Protection Agency has caused both consumers and advocacy groups to question whether the jitter-free beverage is safe to drink.

The main concern is that one of the primary methods companies use to decaffeinate coffee involves methylene chloride, a solvent that has been linked to an increased risk of cancer and other adverse health effects. These health hazards prompted the EPA to ban most commercial uses of the solvent, which has been used in a variety of products, including adhesives and paint strippers.

But the new EPA rule does not apply to the use of methylene chloride in food, since it's outside the agency's purview, so producers can still use the solvent to decaffeinate coffee. And the US Food and Drug Administration, which regulates this use case, says that the solvent is safe to use as long as the amount left in roasted coffee beans does not exceed 10 parts per million.

Organizations such as the Environmental Defense Fund have argued that because methylene chloride is a known carcinogen, no amount of it is safe for human consumption. In collaboration with other environmental and health advocacy groups, the EDF filed a petition with the FDA earlier this year to ban methylene chloride in food.

National Coffee Association CEO William Murray has pushed back against the petition and says in an email, "there is no evidence that drinking decaffeinated coffee causes health problems."

But how and why is methylene chloride used to remove the caffeine from coffee, and can other solvents accomplish the same task?

The chemistry of decaffeination

All decaffeination methods begin the same way: by steaming the dense, dried green coffee beans or soaking them in hot water. This step prepares the beans for caffeine extraction by opening up their pores and separating the caffeine from the chlorogenic acid it's affixed to (*Crit. Rev. Food Sci. Nutr.* 1999, DOI: 10.1080/10408699991279231). The hot temperature also increases caffeine's solubility.

From there, most producers use an organic solvent that the partially polar caffeine molecules are soluble in.

Some producers opt to soak the waterlogged beans directly in the organic solvent. Often that's methylene chloride, though ethyl acetate has also been used since the early 1980s.

"There's less concern about ethyl acetate because it's a naturally occurring chemical" found in fruits and vegetables, says Tonya Kuhl, a professor of chemical engineering at the University of California, Davis, and codirector of the UC Davis Coffee Center. "Of course, it's all industrially produced," she points out. "They're not stripping it out of fruits for decaffeination."

For the more hazardous methylene chloride, Kuhl explains that because it isn't soluble in water, the solvent doesn't penetrate very far into the waterlogged seed. Instead, caffeine removal happens where the aqueous and organic layer meet, near the surface of the bean.

Any trace amount of either solvent that remains in the coffee then evaporates off as the beans are dried and roasted. Both steps typically occur above 200 °C, far above the boiling point of both methylene chloride or ethyl acetate.

"Of course, it's hard to remove the last little tiny bits of anything," Kuhl says.

The Clean Label Project, a nonprofit organization that advocates transparent food and consumer product labeling, tested for methylene chloride in popular coffee brands. The nonprofit's staff found traces of the solvent in several of their samples, though the amounts present were always below the current FDA limit.

"Even with all this, it's still a healthy drink for you," Kuhl says. Many studies have documented positive health effects associated with coffee, including decaffeinated coffee (*Crit. Rev. Food Sci. Nutr.* 2021, DOI: 10.1080/10408398.2020.1779175)…

Article from C&EN, Chemical & Engineering News, American Chemical Society Magazine, August 29, 2024, page 24:

"Climate change is already bad, but we can still fix this problem"

Climate scientist Rob Jackson talks his new book and the case for restoring the atmosphere

By Katherine Bourzac, special to C&EN

https://cen.acs.org/environment/greenhouse-gases/Climate-change-already-bad-still/102/i27

Climate change is scary. But Stanford University climate scientist Rob Jackson says this should motivate us to take action. In his new book, Into the Clear Blue Sky, Jackson takes readers on a world tour of climate solutions. Jackson introduces scientists and entrepreneurs who are developing green steel, plant-based meat, and carbon sequestration technologies, and local activists who are restoring wetlands and advocating for climate justice.

Jackson has a front-row seat to the world's still-rising greenhouse gas emissions. He's chair of the Global Carbon Project, a group of hundreds of volunteer scientists who calculate and publish what he calls a "pulse-of-the-planet estimate" of emissions.

The atmosphere is in need of repair. But Jackson is particularly optimistic about the potential for restoring atmospheric methane to preindustrial levels—something he says we can accomplish in our lifetimes if we start cutting emissions now. Katherine Bourzac talked with Jackson about his book, his research on methane, and how we can, as he puts it, go "from climate despair to climate repair." This interview was edited for length and clarity.

What inspired you to write this book?

I wanted to try and reach an audience beyond the people I normally do.

I view my book as a home repair manual for the planet. It highlights the people and the ideas needed to solve the climate crisis. I want most of all to give people hope, a sense of optimism. Yes, climate change is already bad, but we can still fix this problem…

Rob Jackson Vitals

- Hometown: Houston
- Current position: Professor of earth system science, Stanford University
- Education: PhD, ecology, Utah State University, 1992; MS, statistics, Utah State University, 1992; MS, ecology, Utah State University, 1990; BS, chemical engineering, Rice University, 1983
- Professional highlights: With the exception of working with students, the Global Carbon Project. It probably has the most impact of anything I do.
- Favorite place he traveled for the book: A Finland site that was ravaged by peat mining for decades. It inspired me because people there are trying to restore habitats the best they can in a climate-constrained world. Being there and seeing the thriving life today—it's inspiring to see people working to bring habitats back even if they're not exactly the same as they were at first.

Article from C&EN, Chemical & Engineering News, American Chemical Society Magazine, August 29, 2024, page 27:

"Indoor air monitoring goes to school"

Across the US, schools have begun measuring air quality en masse. Researchers are helping interpret the data

By Fionna Samuels

https://cen.acs.org/analytical-chemistry/Indoor-air-monitoring-goes-school/102/i27

The COVID-19 pandemic put the importance of indoor air quality in stark relief. The air in schools was of particular concern, and that concern spurred collaboration between researchers and school staff to find interventions to improve air quality to safeguard the health of students and staff. Data from indoor air monitors revealed that filter-based portable air cleaners were effective at removing airborne particulates. Ongoing research and monitoring will determine if this effort is making a beneficial health impact and will be used decide how to manage indoor air quality going forward.

The science of indoor air quality used to be of interest only to researchers and people working in hazardous spaces. Then the COVID-19 pandemic swept across the world. Seemingly overnight, people outside those niche communities began worrying over the quality of indoor air. Schools were a focal point: kids needed to return to class, and virus-free air was fundamental to their safety.

In Colorado and Boston, collaborations between scientists and school districts that helped get students safely back to school at the height of the pandemic have continued and expanded. The indoor air monitoring programs that begun during the pandemic are now ensuring that kids headed back this fall are breathing clean air in homeroom.

"The little kids were the first ones to go back to school, and they were the last to get vaccinated." says Mark Hernandez, a professor of environmental engineering at the University of Colorado Boulder (CU Boulder). Young children don't always wear masks properly or reliably, so when schools reopened, administrators had to deploy a different intervention to keep them from becoming ill.

It took time—and intense advocacy from scientists—for health officials to publicly accept that COVID-19 is transmitted primarily through the air (*Clin. Infect. Dis.* 2020, DOI: 10.1093/cid/ciaa939). When that fact was finally acknowledged, the US Centers for Disease Control and Prevention (CDC) recommended increasing ventilation to help prevent the virus's spread.

But it took years for the agency to offer specific guidance. In fact, it wasn't until the day after the US ended its COVID-19 public health emergency in May 2023 that the CDC provided a precise ventilation target of five air changes per hour in any occupied space. For schools to meet this target, the air in every classroom would need to be completely refreshed every 12 min. In Denver, Hernandez says, "none of these schools could do that."

Some schools lacked a central ventilation system. Others had systems too old to generate the air flow needed to achieve that air-exchange rate. Opening a window might work on warm days but risks exposing kids to outdoor air pollution from vehicles, nearby industrial plants, or wildfires.

Retrofitting or updating ventilation systems wasn't feasible as Colorado schools began reopening toward the end of 2020. Local permitting laws made it difficult to modify the facade of older public buildings, including

schools, but such changes are often necessary to install new ventilation equipment. Even if the alterations were allowed, there was no time for major overhauls with children already returning to classrooms.

Modeling studies conducted before the pandemic suggested that mobile, filter-based air cleaners could minimize the spread of disease, Hernandez says, but there was little real-world data to support the models. Hoping to protect kids while generating field data for other scientists to build off, he procured nearly $1 million in funding from three companies—Carrier, Intel, and Ryan Innovation Group—to devise a protocol to assess the effectiveness of air purifiers in elementary school classrooms.

“The air purifiers are like a seat belt”—a stopgap solution that could protect kids from COVID-19, Hernandez says. The purifiers are essentially a high-efficiency particulate air (HEPA) filter and fan and about the size of a suitcase…

CLE AIChE
The Global Home of Chemical Engineers

DOING A WORLD OF GOOD

Process Safety Fundamentals with Chemical Processes is widely regarded as a vital and significant part of an overall Environment, Health and Safety Management System for chemical operations. We will briefly examine some recent process safety incidents which will help us understand the history and origins of chemical process safety. We will lay the groundwork for a comprehensive process safety management system for chemical operations.

Session #1- 16Oct2024, $25/Person, Mike Daymut Community Room SFD; 11297 Webster Rd., Strongsville, 44136
In this session we will focus on what it means to understand our chemical processes. What information is critical, and how this information is the backbone of a robust process safety management system. From 6 to 8:30 PM.

Session #2- 23Oct2024, $25/Person, Mike Daymut Community Room SFD; 11297 Webster Rd., Strongsville, 44136
This session will build on what we learned in session #1. After understanding our processes, their hazards and their safe operating limits, we will focus on learning how to consistently operate and maintain our systems following documented procedures and standards. Essential elements of operation and maintenance. From 6 to 8:30 PM.

Session #3- 30Oct2024, $25/Person, Mike Daymut Community Room SFD; 11297 Webster Rd., Strongsville, 44136
In this session we will use what we learned in the previous two sessions combined and, using a practical perspective, study the core element of process safety: Management of Change. Time permitting, we will work on an example of how change is managed. From 6 to 8:30 PM.

Presenting:

Mr. Gurmukh Bhatia, CPSA, is President of RPSC, LLC a Risk & Process Safety Consulting services company. He retired as the Corporate Director for Process Safety and Chemical Security from The Sherwin-Williams Company, with over 45 years of work experience in the chemical industry. Mr. Bhatia is certified by the Board of Environmental, Health, and Safety (EHS) Auditor Certification (BEAC) as a Certified Process Safety Auditor (CPSA) with 15 years of auditing experience in Process Safety Management (PSM) regulated facilities. He is presently serving on the CLE AIChE Steering Committee as the Risk and Process Safety Director. Mr. Bhatia graduated from the Case Institute of Technology with a Bachelor's Degree in Chemical Engineering.

Registration:
Please register with Joseph Yurko at yurkojoe5@gmail.com by October 8, 2024 for these events.
The registration fee is $25 for each seminar session. You may take one, two, or all three sessions. The registration fee will be paid at the door the day of the event with credit card, cash or check payable to AIChE Cleveland Section #017. The fee will include dinner and a CLE AIChE Professional Development Hour certificate for completing the event. Certificates will be awarded later for each event, and if all three events are taken, then a fourth certificate will be awarded.

Strongsville Fire Department, Ward 1, 11297 Webster Road, Strongsville, OH 44136, Mike Daymut Comnty. Room:
Our host has reserved the Community Meeting Room for our event the last three Wednesdays of October 2024.

CLE AIChE: Cleveland Chapter

Fall 2024 – Spring 2025 Program Planning

(as of Sep2024)

Month	Topic, Speaker	Location	AIChE Officer Responsible
September 7, 2024 (6 PM)	Oktoberfest Social Event	German Central Farm, Parma	Joe Yurko, $7/guest admission + $ food & beverage free for CSU AIChE students. https://germancentralfoundation.com/oktoberfest
September 11, 2024 (Wednesday 2:30 – 3:30 PM)	Dr. Yu, CSU, IEEE Quantum Computer	CSU, Engineering CSU AIChE & IEEE Students	Joe Yurko & Dr. Gatica, Dr. Holland, Members: $10; Students: Free CLE AIChE: Pizzas & Beverages
October 10, 2024 (Thurs. 6 PM)	M.W. Wilson Company Steam Safety Class & Tour	M.W. Wilson Company 2579 Center Road Hinckley, OH 44233	Joe Yurko, Jeff Wilson, Dinner provided by M.W. Wilson Co.? M.W. Wilson Co.: 330-225-0663 https://www.wmsilsoncoinc.com .
October 2024 (6 PM) Wed. 16Oct2024 Wed. 23Oct2024 Wed. 30Oct2024	Chemical Process Safety Analysis Seminars: by Gurmukh Bhatia, CPSA	Strongsville Fire Dept. Ward 1 Community Rm 11297 Webster Road, Strongsville, OH 44136	Joe Yurko, Dinner cost is included in the seminar expense. Seminar expense: $25 per session with a total of 3 sessions. Certificates will be awarded for each class as well as a final certificate. sfd: 440-580-3210: HTTPS://WWW.STRONGSVILLE.ORG/DEPARTMENTS/FIRE-EMERGENCY-SERVICES/STATIONS-AND-EQUIPMENT
November 13, 2024 Wednesday (4:00 – 6:00 PM)	Benjamin A. Horwitz "Portrait of a Chemical Engineer" Career Discussion with students and professionals	CSU AIChE Section Joint Meeting, Washkewicz College of Engineering ?	Joe Yurko, Dr. Gatica, Dr. Holland, CLE AIChE Meals: Professional members: $10; Students: Free CLE AIChE: Pizzas & Beverages
December 2024 (6 PM)	Nuclear Power an Introduction, Speaking: Andrew Ohrablo ?	The Sanctuary, Rockside Road Independence, 44131	Joe Yurko, Dinner menu ordering for professional members; Students cost: $5 http://places.singleplatform.com/shulas-steak-house-8/menu#menu_5599999
January 2025 (6 PM)			
February 2025 (6 PM)	Appalachian Regional Clean H2 Hub ARCH2 DOE Award, Andrew Thomas, JD, CSU ?	The Sanctuary, Rockside Road Independence, 44131	Joe Yurko, Dinner menu ordering for professional members; Students cost: $5 http://places.singleplatform.com/shulas-steak-house-8/menu#menu_5599999
March 2025 (6 PM)	Safety Engineering in Oil Refining processes; Marianne Corrao Speaking ?	The Sanctuary, Rockside Road Independence, 44131	Mike Galgoczy, Dinner menu ordering for professional members; Students cost: $5 http://places.singleplatform.com/shulas-steak-house-8/menu#menu_5599999
April 2025 (6 PM)	NEOSEF Awards Banquet	CCPL Branch Library ?	Joe Spagnuolo, Moderator NEOSEF Students, CCPL Branch Library Dinner: Pizza, professional members: $10; Students: Free
May 2025 (6 PM)	Tour?		

In person events -- Remote meetings if non-contact required / COMPLETED MEETING / PLANNED MEETING / PROPOSED MEETING

Cleveland Section 017 of THE AMERICAN INSTITUTE OF CHEMICAL ENGINEERS Steering Committee 2024 - 2025

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