NEWS BRIEFS

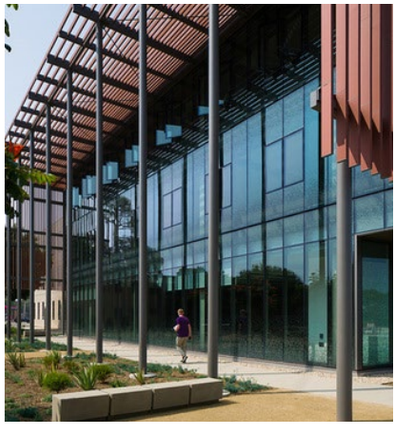


Photo Credit: JEFF LIANG

Award-winning Henley Hall, seen from the south (left) and from the north.

HENLEY HALL: HONORS AND ACHIEVEMENTS

Henley Hall, which opened in 2020 as the home of the College of Engineering's Institute for Energy Efficiency (IEE), received some major honors in 2021, earning The American Architecture Award as well as LEED Platinum certification from the US Green Building Council, its highest rating for energy efficiency and sustainability.

Presented jointly by The Chicago Athenaeum: Museum of Architecture and Design, and The European Centre for Architecture Art Design and Urban Studies, the American Architecture Award honors the best in new and cutting-edge design in the U.S. and promotes American architecture and design here and abroad. The firm Kieran Timberlake designed the building, which has been recognized further by the American Institute of Architects (AIA), receiving awards from chapters in Santa Barbara, the city of Philadelphia, and the state of Pennsylvania. It also received an AIA Committee on the Environment Award of Excellence, which recognizes one project each year that demonstrates the highest level of commitment to sustainable design.

UCSB alumnus **Jeff Henley** and his wife, **Judy Henley,** an honorary alumna, sparked the donor-funded project with a $50 million gift to the College of Engineering in 2012. Silicon Valley–based alumna **Shawn Byers** and her husband, **Brook,** also made a significant contribution.

"Henley Hall is a reflection of UC Santa Barbara's commitment to energy efficiency, and our campus is thrilled that this state-of-the-art building has been nationally recognized for its innovative architectural design and superb sustainability," said **Chancellor Henry T. Yang.** "We are immensely grateful to donors Jeff and Judy Henley, and Shawn and Brook Byers for their tremendous vision and generosity in making Henley Hall — and these subsequent recognitions — a reality."

The 50,000-square-foot building, a model of efficiency that was constructed with more than twenty-percent recycled materials, includes passive features such as solar shading and a high-performance "skin," and active features that include demand-controlled ventilation and high-efficiency lighting modulated for occupancy and outdoor conditions. The building's extensive natural lighting, intelligent energy monitoring and control systems, and LED lighting yield a forty-percent energy savings over similar lab buildings.

Henley Hall is also a state-of-the-art research-and-learning facility, with both wet and dry labs, collaborative break-out spaces, conference rooms, a 124-seat lecture hall, and faculty and administrative offices. On the east side of the building, workspaces and offices have operable windows that stimulate airflow through an open, light-filled multistory atrium. On the west side, where labs are situated, air-monitoring and occupancy sensors reduce energy use for ventilation while protecting the safety of occupants and their research.

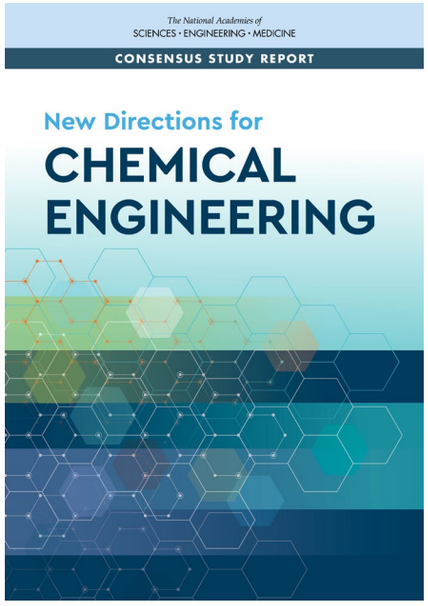
"We designed Henley Hall to be energy-efficient from the ground up," said **John Bowers,** IEE director and a professor of electrical and computer engineering. "It is great to have received such recognition for those efforts."

Bowers, the Fred Kavli Chair of Nanotechnology, describes Henley Hall as "a wonderful building to work in," adding, "The natural ventilation gives it a fresh, clean feel that we all love."

The ethos of the institute perfectly matched that of Kieran Timberlake. "We are honored to have worked with UC Santa Barbara to make Henley Hall the ideal home for the IEE," said Jason Smith, a partner at the firm. "Our expertise in innovative, sustainable design aligns with their forward-thinking mission to create new technologies in pursuit of an energy-efficient future."

"Energy efficiency is key to solving climate change and making U.S. industry more efficient in terms of energy use and expense," Bowers noted. "Henley Hall is essential to expanding UCSB's contributions in that important area."

WHICH WAY CHEM-E?



Rachel Segalman, the Schlinger Distinguished Professor and Department Chair of Chemical Engineering in the UC Santa Barbara College of Engineering, is one of seventeen members of an interdisciplinary committee (and one of two from UC campuses) that drafted an important new report mapping out the goals, challenges, and likely directions related to chemical engineering over the next ten to thirty years. "It will likely be pretty impactful in the discipline and beyond, similar to how the previous report, published more than thirty years ago, served as a roadmap for chemical engineers," said Segalman, who is also the Edward Noble Kramer Professor of Materials. "The work considers rapid advances in science and technology that have significantly changed the landscape of chemical engineering, ranging from computer modeling and machine learning to the growing focus on sustainability."

A preliminary web-based release of the 335-page report, titled *New Directions for Chemical Engineering (2022),* and published by the National Academies Press, a division of the National Academy of Sciences (NAS), went live on Feb. 9 on the NAS website. A public webinar was held on Feb. 28, and hard copies were released in March.

The purpose of the report, reads the preface, is "to articulate the status, challenges, and promising opportunities for chemical engineering in the United States, and benchmark its international stature, for the next ten to thirty years." Simply stated, the authors set out to answer the question: What is the future of chemical engineering?

In shaping that future, chemical engineers will need to grapple with what has already been done, including the creation of plastics and fluorinated chemicals, which, the authors write, "continue to cause unintended" environmental problems and give rise to greenhouse gasses that have put Earth's life-sustaining climate at significant peril. Further, they add, "Chemical engineers' ability to apply systems-level thinking from molecular to manufacturing scales uniquely positions them to address today's most pressing problems, including climate change and the overuse of resources by a growing population." The report suggests that chemical engineering is "well positioned as the enabling discipline in decarbonizing energy systems and materials without an impact on reliability and cost, while [remaining] cognizant of the existential threat of global climate change."

Chemical engineers, the report suggests, will lead in the work of engineering targeted, accessible solutions for human health, with impacts ranging from the development of personalized medicine, to applications of systems engineering in biology and health, to the production and end-of-life considerations of useful materials in a circular economy. In this and coming decades, chemical engineers will also increasingly apply new tools, such as machine learning and artificial intelligence, to solve complex problems.

The volume includes a global perspective, addressing, for instance, the need to invest in the U.S. research enterprise given China's large investments in technologies that are "either central or highly relevant to chemical engineering."

The report also details the kind of interdisciplinary, cross-sector collaborations that will be necessary to advance important societal goals, such as transitioning to a low-carbon energy system, ensuring sustainable production and use of food and water, developing medical advances and engineering solutions to support health equity, and manufacturing in ways that generate less waste and pollution.

New Directions contains a diversity-and-accessibilty component as well, calling for changes in chemical engineering education to ensure that the next generation of chemical engineers is more diverse and is equipped with the skills necessary to address the challenges ahead.

Glenn Fredrickson, the Mitsubishi Chemical Chair in Function Materials and professor of chemical engineering at UCSB, also provided input into the report.

KYLE LEWIS APPOINTED FELIPE CHAIR IN TECHNOLOGY MANAGEMENT

Kyle Lewis, chair of the Technology Management (TM) Department in the College of Engineering, has been appointed the Christian A. Felipe Chair in Technology Management. Felipe, a longtime investment-fund manager and angel investor, established the chair in 2014 with a $1 million endowment that also helped launch the Master of Technology Management (MTM) program. At the time, Felipe described the endowment as a great opportunity to create future entrepreneurs and technology leaders, and to recruit and retain top-notch faculty.

"I am pleased that Kyle Lewis has been honored with the Christian A. Felipe Chair in Technology Management," said Felipe. "She brings a wealth of research experience to the multidisciplinary field to explore the opportunities and challenges of ever-evolving technology."

Kyle Lewis

"It is an honor and a privilege to be appointed to the Christian A. Felipe Chair in Technology Management," said Lewis, who has been recognized previously as a recipient of the Jay Wright Forrester Award from the System Dynamics Society, as well as being named among the Top 50 Women in Business by the *Pacific Coast Business Times.* "Mr. Felipe's generosity has helped our department build an ecosystem for entrepreneurs in the Santa Barbara community, especially in the technology industry. We will continue to pursue that mission through leading-edge research and innovative teaching."

> "KYLE LEWIS HAS BEEN A DRIVING FORCE BEHIND THE DEVELOPMENT, GROWTH, AND SUCCESS OF THE TM DEPARTMENT."

Led by dedicated, award-winning faculty members who work in collaboration with industry partners, mentors, and lecturers, the Technology Management Department provides a unique business education that includes insights into both the theory and practice of forming and managing technology-driven enterprises.

Nearly two thousand undergraduate and graduate students participate annually in one or more of the academic programs offered by the TM Department, which include a PhD track in Technology Management, a Master of Technology Management, and UC–recognized undergraduate and graduate-level Certificates in Technology Management.

"Kyle Lewis has been a driving force behind the development, growth, and success of the Technology Management Department," said **Tresa Pollock**, interim dean of the College of Engineering and the Alcoa Distinguished Professor of Materials. "We congratulate her on this appointment, which is a well-deserved acknowledgement and recognition of her dedication as a chair, researcher, mentor, teacher, and colleague."

Lewis studies how organizations leverage individual and collective knowledge. She examines the performance of teams, especially those engaged in knowledge work such as professional services, new-product development, science and engineering, and project-based tasks. She has published articles in numerous top scholarly journals, served as a division chair in the Academy of Management, as senior editor for *Organization Science*, and as associate editor for *Management Science.* Prior to coming to UCSB in 2014, Lewis was a professor of management and faculty director of the Master of Science in Technology Commercialization (MSTC) program in the McCombs School of Business at the University of Texas at Austin.

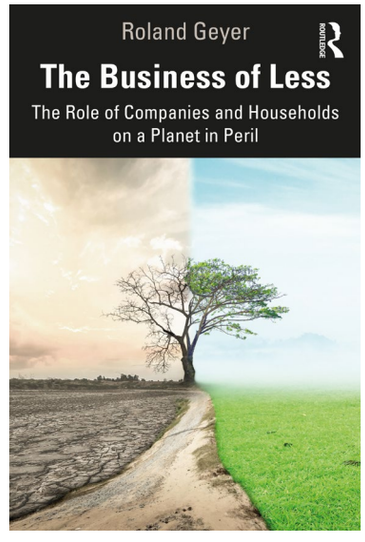
GETTING TO "NET GREEN"

Bren School professor of industrial ecology Roland Geyer

For the past roughly thirty years, ideas about corporate sustainability have tended to be synonymous with the pursuit of "eco-efficiency" and "win-win" opportunities, sometimes recast in the folksy phrase "doing well by doing good." It makes sustainability sound friendly and easy, and certainly something that can be achieved without much sacrifice.

Roland Geyer has an issue with that, and in his new book, *The Business of Less: The Role of Companies and Households on a Planet in Peril* (Routledge, 2022), the professor of industrial ecology at the Bren School of Environmental Science & Management casts a decidedly critical, highly expert eye on that feel-good notion of sustainability — the one, he says, "meant to assure us that companies can be protectors of the environment while also being profit maximizers."

An industrial ecologist with a background in physics, engineering, and economics, Geyer is an expert in life cycle assessment, the discipline that tracks the environmental impacts of products from resource extraction through manufacturing, transportation, useful life, and end of life. He has co-authored high-profile journal papers that quantified all of the plastic in the world's oceans and, later, all of the plastics ever made.



He has looked at the strategies for achieving important goals, such as cutting carbon emissions in the atmosphere and reducing plastics in the oceans, up, down, and inside out, and he finds them lacking. In *The Business of Less,* he introduces a new paradigm — "net green" — based on the idea that to reverse the alarming degradation of the planet we are currently witnessing will require businesses and consumers not just to improve the efficiency of their products, but actually to make and buy fewer of them.

That's right; Geyer proposes making, having, using, and throwing away less "stuff." He suggests, rather, placing a higher value on labor, the only input into products and services that has no environmental impact, and using that orientation to develop an economy that values labor over things. He lays out his case in a highly approachable book that is filled with anecdotes, evidence, examples, and clear language that spares the reader scientific jargon, acronyms, and unreadable "science" sentences.

CONNECTING THE MOLECULAR DOTS OF CANCER

Tumors are generally stiffer than the healthy tissue that surrounds them, and research shows that a stiffer tumor can contribute to the cancer's progression. But exactly how a stiff tumor affects a cancer cell's epigenome, the set of chemical modifications on a cell's DNA that regulate expression of genes, remains unknown.

Ryan Stowers, an assistant professor of mechanical engineering at UC Santa Barbara, has just been awarded a 2022 Young Investigator Grant (YIG) from the Breast Cancer Alliance (BCA). It was one of only five such awards given this year to support research aimed at identifying the biochemical pathway that drives the initiation and progression of cancer. The award provides early-career faculty with $125,000 in critical seed funding to generate the proof-of-concept evidence needed to apply for larger, longer-term grants, often with the National Institutes of Health (NIH).

"I am thrilled and honored to receive this grant, as only a handful of them are given out each year," said Stowers, adding that the two-year grant will fund a PhD student, research supplies, and fees to utilize shared facilities. "This funding will help support some of my lab's initial projects in the area of cancer mechanobiology, and the recognition it provides will help to establish us in the cancer-research community."

Broadly, mechanobiology is the study of how cells interface with and respond to their environment by changing how they appear and how they act.

Recently, the Stowers group demonstrated the first direct evidence that stiff environments can induce cancer-like behaviors through changes to the epigenome.

In his BCA-supported project, titled "Understanding Epigenomic Remodeling Inducted by Tumor Mechanical Properties," Stowers will investigate how the genome, the complete set of DNA in a cell, is reorganized in response to stiff environments. Epigenomic regulation, in part, enables the cell to express only certain genes, and not the entire DNA genome, a control mechanism that is disrupted in many cancers.

"In this research, we are trying to connect the molecular dots between the stiff environment outside of a cell and the altered gene expression and behavior of the cell itself, in order to identify a novel mode of cancer regulation," said Stowers, who joined UCSB's College of Engineering faculty in 2019 after earning his PhD in biomedical engineering from the University of Texas at Austin. "It has become increasingly clear that the stiff-tumor microenvironment can cause changes in cancer-cell behavior that exacerbate the disease."

Researchers in the Stowers lab create artificial tumor microenvironments by encapsulating cells in three-dimensional, mechanically tunable hydrogels. This allows them to more closely mimic the natural tumor environment, compared to culturing cells on flat, unnaturally hard petri dishes made of plastic or glass.

"We will use these hydrogels to precisely control the stiffness the cells are exposed to, and then evaluate the extent to which their epigenomes are remodeled," he explained. "Over the course of the two-year award, we will aim to identify the molecular pathway through which this stiffness sensing and signaling occur, and we will use high-throughput sequencing techniques to map out the changes we see."

Ryan Stowers received a Young Investigator Grant from the Breast Cancer Alliance.

The team also plans to investigate how long the epigenomic changes induced by the tumor microenvironment persist. Their findings could also explain why tumor cells demonstrate the so-called *memory effect*, a phenomenon in which cancer cells, after being primed by a stiff primary tumor, then invade the surrounding tissue and migrate away from the tumor. Epigenomic memory imparted to the cells could explain why cells persistently invade during metastasis.

"This project is still very much about basic discovery and exploration," said Stowers. "However, if successful, we could uncover a new pathway that promotes breast cancer progression, which would provide targets for therapeutic intervention."

> "THEIR FINDINGS COULD ALSO EXPLAIN WHY TUMOR CELLS DEMONSTRATE THE SO-CALLED MEMORY EFFECT, A PHENOMENON IN WHICH CANCER CELLS, AFTER BEING PRIMED BY A STIFF PRIMARY TUMOR, THEN INVADE THE SURROUNDING TISSUE AND MIGRATE AWAY FROM THE TUMOR."