

# MIT Industrial Liaison Program Faculty Knowledgebase Report

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## Decarbonizing Buildings

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February 24, 2021 10:00 am - 12:00  
pm

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10:00am - 10:05am

Welcome Remarks  
CJ (Changjie) Guo  
Program Director, MIT Corporate Relations  
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Program Director, MIT Corporate Relations

Dr. CJ Guo joined the Office of Corporate Relations as a Senior Industrial Liaison Officer in July, 2015. CJ comes to OCR with 25 years of extensive global experience in technology innovations, portfolio management and business development in emerging and conventional energy sectors with leading multinational corporations in the US, China and Canada.

CJ is a leading expert in emerging energy technologies and energy system transitions. With Shell, he was the Emerging Technology Theme Leader in China/Beijing (2011 to 2015), worked extensively with the Chinese energy communities on the country's future energy landscape, and the Senior Technology Advisor in alternative transportation fuels in the US / Houston (2006-2010), and served during 2010 as Chairman of the Fuel Operations Group for the US DOE FreedomCar Partnership. Prior to joining Shell, CJ has held technology development, commercialization and management positions with Air Liquide (2002-2006) and The BOC Group (1995-2001) after working as a research scientist in oil-sands upgrading with CANMET in Canada (1992-1994).

CJ earned his Ph.D., Chemical Engineering, at CSU, Ohio, his M.S. and B.S., Chemical Engineering at TYUT, China. He has earned various awards from Shell, Air Liquide, BOC, Shanxi Province (China). He holds many patents and has sat on the board of Shenzhen Sanmu Battery Technology Company as an independent board member during 2009-2010.

10:05am - 10:10am

Introduction to MITEI and the Session  
Robert Stoner  
Deputy Director for Science and Technology, MIT Energy Initiative  
Founding Director, MIT Tata Center  
Robert Stoner  
Deputy Director for Science and Technology, MIT Energy Initiative  
Founding Director, MIT Tata Center

Robert J. Stoner is an inventor and technology entrepreneur who has worked extensively in academia and industry throughout his career, having built and managed successful technology firms in the semiconductor, IT and optics industries. From 2007 through 2009 he lived and worked in Africa and India while serving in a variety of senior roles within the Clinton Foundation. Stoner also serves as Director of the Tata Center for Technology and Design at MIT, and as the faculty co-director of the MITEI Electric Power Systems Center. His current research relates to energy technology and policy for developing countries. He earned his Bachelor's degree in engineering physics from Queen's University, and his Ph.D. from Brown University in condensed matter physics.

10:10am - 10:35am

Subject Framing, Building Retrofit Opportunities - Video starts at time stamp: 7:07  
Christoph Reinhart  
Professor, School of Architecture + Planning  
Director, Building Technology Program  
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Professor, School of Architecture + Planning  
Director, Building Technology Program

Christoph Reinhart is a building scientist and architectural educator working in the field of sustainable building design and environmental modeling. At MIT he is leading the [Sustainable Design Lab](#) (SDL), an inter-disciplinary group with a grounding in architecture that develops design workflows, planning tools and metrics to evaluate the environmental performance of buildings and neighborhoods. He is also the head of [Solemma](#), a technology company and Harvard University spinoff as well as Strategic Development Advisor for [mapdwell](#), a solar mapping company and MIT spinoff. Products originating from SDL and Solemma are used in practice and education in over 90 countries.

Before joining MIT in 2012, Christoph led the sustainable design concentration area at Harvard's Graduate School of Design where the student forum voted him the *2009 Teacher of the Year* for the Department of Architecture. From 1997 to 2008 Christoph had worked as a staff scientist at the National Research Council of Canada and the Fraunhofer Institute for Solar Energy Systems in Germany. He has authored over 140 peer-reviewed scientific articles including [two textbooks](#) on daylighting and seven book chapters. His work has been supported by a variety of organizations from the US National Science Foundation and the Governments of Canada, Kuwait and Portugal to Autodesk, Exelon, Kalwall, Philips, United Technology Corporation and Sage Electrochromics.

Christoph's work has been recognized with various awards among them a *Fraunhofer Bessel Prize* by the Alexander von Humboldt Foundation (2018), the IBPSA-USA *Distinguished Achievement Award* (2016), a *Star of Building in Science* award by Buildings4Change magazine (2013) and seven best paper awards. Mapdwell has been recognized with FastCompany's *Design by Innovation 2015* award for Data Visualization as well as a *Sustainia 100* award. Christoph is a physicist by training and holds a doctorate in architecture from the Technical University of Karlsruhe.

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10:35am - 10:55am

Reducing Embodied Energy with Novel Building Structure - Video starts at time stamp: 46.46  
Caitlin Mueller  
Associate Professor, Structural Design  
Director, Digital Structures Research Group  
Joint appointment with Civil and Environmental Engineering Department  
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Associate Professor, Structural Design  
Director, Digital Structures Research Group  
Joint appointment with Civil and Environmental Engineering Department

Caitlin Mueller is a researcher, designer, and educator working at the interface of architecture and structural engineering. She is currently an Associate Professor in the Building Technology Program, where she leads the Digital Structures research group and co-directs the Structural Design Lab.

As a researcher, Mueller focuses on developing new computational methods and tools for synthesizing architectural and structural intentions in early-stage design. She also works in the field of digital fabrication, with a focus on linking high structural performance with new methods of architectural making. In addition to her digital work, she conducts research on the nature of collaboration between architects and engineers from a historical perspective. Mueller also aims for interdisciplinary learning and integration in her teaching efforts, which include subjects in structural design and computational methods.

[View full bio](#)

10:55am - 11:15am

Advanced Heat Pumps - Video starts at time stamp: 24.58

Leslie Norford  
Professor, Building Technology  
Associate Head, Department of Architecture  
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Professor, Building Technology  
Associate Head, Department of Architecture

Leslie Norford is Professor of Building Technology and Associate Head of the Department of Architecture at MIT. His research focuses on reducing building energy use and associated resource consumption and carbon emissions and his teaching includes project-based efforts to improve schools in developing countries and promote the use of simulation-enhanced building design workflows. He has developed fault detection and optimal control strategies for HVAC equipment and explored design options for low-energy space-conditioning systems based on the use of desiccants and membranes for latent cooling. Working with mechanical and electrical engineering colleagues and students at MIT, he has studied how control of HVAC systems can help electric utilities mitigate the impact of power fluctuations associated with wind and PV systems through provision of such services as power reserves and frequency regulation. Active internationally, he has conducted measurement campaigns and numerical analyses of building energy consumption in Russia, China, Pakistan, the UK and Norway. Recent work in India focused on indoor and ambient air quality, with emphasis on mitigating the impact of cooking and land-clearing fires in agricultural areas that surround cities. Over a decade of leading a research group in Singapore, under the auspices of the Singapore-MIT Alliance for Research and Technology and related work with colleagues in Abu Dhabi produced measurements and models of urban microclimates, with a focus on identifying strategies to improve human thermal comfort in outdoor urban areas.

[View full bio](#)

11:15am - 11:35am

Future of Building Energy - Video starts at time stamp: 1.03.14

Yang Shao-Horn  
Keck Professor of Energy, Mechanical Engineering  
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Keck Professor of Energy, Mechanical Engineering

Professor Shao-Horn joined the Mechanical Engineering Energy and Transport Division in September 2002 as the Atlantic Richfield Career Development Assistant Professor. Upon graduating from the Michigan Technological University in 1998 with a Ph.D. in Metallurgical and Materials Engineering, she joined Eveready Battery Company as a staff materials scientist in their Advanced Technology and Materials Group. She then worked as an National Science Foundation (NSF) International Research Fellow at the Institute of Condensed Matter Chemistry in Bordeaux, France.

Yang (pronounced Young) conducts research on solving material issues in electrochemical energy storage and conversion systems such as batteries and fuel cells. She focuses on understanding the fundamental physical phenomena that occur in active materials and interfaces during electrochemical reactions, probing critical materials properties that limit the electrochemical performance, designing novel materials, and engineering electrode and system designs. Her research group is working on transition metal oxides for lithium rechargeable batteries and solid oxide fuel cells, and electrode assemblies for oxygen reduction.

Among her awards are the Charles W. Tobias Young Investigator Award of the Electrochemical Society 2008; the Tajima Prize of the International Society of Electrochemistry 2008; the Dupont Young Faculty Award 2006; Office of Naval Research (ONR) Young Investigator Award 2003.

[View full bio](#)

11:35am - 11:55am

Q&A Session - Video starts at time stamp: 1.20.22

Robert Stoner  
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Closing Remarks  
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