Keynote Speeches Overview

Seven perspectives on artificial intelligence, energy markets, climate policy, and the global transition to a low-carbon economy.

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KEYNOTE I

Global Energy Markets in Risk Environments: A Perspective of Artificial Intelligence

Witold Pedrycz

Professor, University of Alberta, Canada

ABSTRACT

Artificial Intelligence (AI) and Machine Learning (ML) have garnered a lot of attention and have led to numerous success stories including those reported in areas of high criticality. The junction of Artificial Intelligence (AI) and global energy markets represents a complex "two-way street" implied by soaring power demands, fragile supply chains, and geopolitical risks. AI is simultaneously a massive consumer of energy and a critical, general-purpose technology required to optimize and secure energy systems and energy markets under extreme stress.

In this talk, we elaborate on the vital role of AI in defending against energy vulnerabilities by addressing quests for predictive resilience and renewable integration, among others. We highlight the ways as mitigating risks through AI-guided optimization. Several representative AI architectures are briefly reviewed. We discuss a geopolitical risk pipeline architecture of predictive AI by identifying key operational streams of text metrics, physical risks assets and structural indicators.

The limitations of the AI technology have become visible and, as such, have already raised concerns about the deployment of the ML constructs (including LLMs) and their exclusive reliance on data. At the center of the AI and ML methodologies lies a default assumption stating the data completely represent (describe) the problem to be solved (e.g., classification or prediction). Enormous masses of data are the blessing and the curse. We analyze this timely and acute problem referred to as the data blinding effect.

We also become cognizant of the key limitations implied by the AI scaling law. To address sustainability of the AI technology, one pushes its agenda to the next conceptual level of Agentic AI. The perception and reasoning (reactive vs. autonomous processing) being the fundamental facets of Agentic AI are identified and contrasted. In the sequel, structural risks of agent autonomy are highlighted and safety levels of Agentic AI providing the guardrails in energy problems are discussed.

A case study Agentic AI and energy operations during the 2026 Strait of Hormuz crisis is covered.

BRIEF PROFILE

Witold Pedrycz (IEEE Life Fellow) is Professor in the Department of Electrical and Computer Engineering, University of Alberta, Edmonton, Canada. He is also with the Systems Research Institute of the Polish Academy of Sciences, Warsaw, Poland. Dr. Pedrycz is a foreign member of the Polish Academy of

Sciences and a Fellow of the Royal Society of Canada. He is a recipient of several awards including Norbert Wiener award from the IEEE Systems, Man, and Cybernetics Society, IEEE Canada Computer Engineering Medal, a Cajastur Prize for Soft Computing from the European Centre for Soft Computing, a Killam Prize, a Fuzzy Pioneer Award from the IEEE Computational Intelligence Society, and Meritorious Service Award from the IEEE Systems Man and Cybernetics Society. His main research directions involve Computational Intelligence, Granular Computing, and AI/Informed Machine Learning. His current IF (Google Scholar) is 146. Professor Pedrycz serves as an Editor-in-Chief of WIREs Data Mining and Knowledge Discovery (Wiley).

KEYNOTE II

Climate Policy Based on Equity, Economic Self-Interest, and Cross-National Learning

Lucas Bretschger

Professor, ETH Zurich, Switzerland

ABSTRACT

The social optimum is a cornerstone of economic theory, but optimal carbon pricing faces strong headwinds in actual policy making. There is a need for workable global climate policies respecting equity, integrating human health, including non-cooperating countries, and avoiding tax resistance. The lecture shows how these issues can be implemented in a successful strategy and how economic self-interest and cross-national learning become important foundations of decarbonization.

BRIEF PROFILE

Lucas Bretschger is Professor Emeritus of Economics at ETH Zurich and Adjunct Professor at the University of Zurich. He earned his PhD in Economics from the University of Zurich in 1988 and was a Visiting Scholar at Princeton University. After completing his Habilitation at the University of Zurich and holding several Visiting Professorships, he was appointed Full Professor at the University of Greifswald, Germany in 1998 and Full Professor of Economics and Resource Economics at ETH Zurich in 2003, where he played a key role in founding and developing the Department of Management, Technology, and Economics (MTEC). His research focuses on resource and energy economics, climate economics and policy, environmental pollution and economic growth, quantitative modeling, trade and regional economics, and sustainable development. He has published more than 100 peer-reviewed articles in leading international journals, as well as several books and numerous policy and teaching contributions. He has led major Swiss and European research projects in climate and energy economics and has served as a long-standing consultant to the Swiss government. He was a member of the Swiss delegation to numerous international climate negotiations. Lucas Bretschger is a former President and Fellow of the European Association of Environmental and Resource Economists (EAERE) and the founder and long-term organizer of the EAERE–ETH Winter School and the SURED Conference at Monte Verità, a flagship forum for research on sustainable resource use and economic dynamics.

KEYNOTE III

Securing the Transition, Sharing the Gains: A Multidimensional Assessment of China's Path to Carbon Neutrality

Zhen Wang

President, CNOOC Energy Economic Institute, China

ABSTRACT

China's drive to carbon neutrality has entered a decisive, newly-legislated phase. In mid-2026, the government issued the New Energy System Plan and the Carbon Peaking Action Plan for the 15th Five-Year Period (2026–2030), turning China's 2035 Nationally Determined Contribution — its first absolute, economy-wide greenhouse-gas target — into binding milestones: a non-fossil energy share of 25 per cent, wind and solar exceeding half of installed capacity, a 17 per cent cut in the carbon intensity of GDP, and a decisive shift from energy to carbon "dual control." Yet the systemic value of this agenda — what it costs, what it returns, and how far its benefits travel — remains largely unquantified.

This keynote presents a multidimensional integrated-assessment framework that treats these newly-issued targets as the backbone of scenario design rather than as backdrop. A current-policy scenario is anchored to the intensity of the 15th Five-Year package; an enhanced-action scenario is aligned with the upper bound of the 2035 NDC and the 2060 neutrality goal; the distance between them defines the "action gap" China must close. Module I couples a computable general equilibrium (CGE) model, an energy-system optimisation (ESO) model, the GAINS co-abatement model and a public-health (HEL) model to trace economic growth, industrial restructuring, carbon and air-pollutant reduction, and avoided premature deaths along each pathway. Module II quantifies the global mitigation spillover of China's photovoltaic and wind exports.

Two findings stand out. Once climate and health co-benefits are monetised against transition costs, closing the action gap delivers large and rising net social benefits at home; meanwhile, China's clean-technology exports carry decarbonisation well beyond its borders, their cumulative lifecycle mitigation projected to exceed 180 gigatonnes of CO2 by 2060. Together they reframe China's transition not as a domestic burden but as a globally shared investment — a decision-ready valuation of ambition under intensifying energy-security and geopolitical constraints.

BRIEF PROFILE

Wang Zhen is Deputy Chief Economist of CNOOC Group and President of its Energy Economics Institute. He is a recipient of the Special Government Allowance of the State Council of China, Fellow of the Energy Institute (UK), and holds a Ph.D. in Economics from the Guanghua School of Management, Peking University. He was also a Fulbright Visiting Research Scholar in the United States. He serves as a

member of the Expert Committee for the National 15th Five-Year Energy Plan of China, a member of the Expert Committee for Tianjin's 15th Five-Year Plan Consultation, and Chairman of the Oil and Gas Sector of the China-SCO Energy Cooperation Advisory Committee, among other roles. His research achievements have received numerous awards, including the First Prize of the Soft Science Outstanding Achievement Award from the National Energy Administration of China, the Second Prize of the Beijing Philosophy and Social Sciences Award, the Best Paper Award at the 9th Global Finance Annual Conference, and the Outstanding Doctoral Dissertation Award of Peking University. His recent publication is the book Energy Transition and Energy Security. His research interests include energy transition, green finance, and related fields.

KEYNOTE IV

Building Life Cycle Data Infrastructure for a Sustainable Transition

Ming Xu

Professor, Tsinghua University, China

ABSTRACT

Life cycle management requires data infrastructure that is transparent, interoperable, representative, and maintainable. This talk shares lessons from building the TianGong life cycle data infrastructure: a computable representation of technology systems supported by traceable evidence, structured workflows, and an open research community. It shows how data can be assembled, validated, connected, and updated to better represent rapidly changing energy and industrial systems, particularly in China. Artificial intelligence acts as an important copilot for extraction, calculation, consistency checks, and evidence tracing, while human expertise remains central. The talk considers how such infrastructure can evolve from a database into a connected ecosystem supporting research, industry, and policy.

BRIEF PROFILE

Ming Xu is the Chair Professor of Carbon Neutrality and Associate Dean in School of Environment at Tsinghua University. Prior to that, he was a Professor at the University of Michigan, Ann Arbor. His research focuses on environmental systems engineering, life cycle assessment, and environmental artificial intelligence. He received the Robert A. Laudise Medal from International Society for Industrial Ecology in 2015, the US National Science Foundation Faculty Early Career Development (CAREER) Award in 2016, the Walter L. Huber Civil Engineering Research Prize from American Society of Civil Engineers in 2021, and the Amazon Research Award in 2024. He was the President of the International Society for Industrial Ecology for 2023-2024. Currently he is the Editor-in-Chief of Elsevier's flagship journal in environmental management, Resources, Conservation & Recycling, a member of the UNEP's International Resource Panel, and a member of the Joint Working Group between GHG Protocol and International Organization for Standardisation on Carbon Footprint of Product Standard. He has been leading the TianGong Initiative (https://www.tiangong.earth) to develop the TianGong life cycle data Infrastructure.

KEYNOTE V

The Local Consequences of the Cloud: Data Centers, Housing Markets, and Grid Resilience

Yueming Qiu

Professor, University of Maryland College Park, USA

ABSTRACT

Data centers are often described as part of the AI and cloud economy, but they are also large local infrastructure projects. They need land, electricity, water, cooling, backup power, and utility upgrades, and their effects on nearby communities can go well beyond jobs and tax revenue. This talk brings together two studies on the local effects of data center growth. The first paper looks at how data centers affect nearby home values, using residential property transactions from CoreLogic and ATTOM. The current analysis covers eight U.S. states — Arizona, California, Georgia, North Carolina, Tennessee, Texas, Virginia, and Washington — from 2005 to 2024. It asks whether data centers show up in housing markets through both potential benefits, such as investment and tax revenue, and potential costs, such as noise, traffic, land-use conflict, and pressure on local infrastructure. The second paper studies data centers and residential power reliability in Florida from 2014 to 2025, using county-level data for all 67 counties. It finds that data center growth is linked to better routine reliability and lower peak outage severity during hurricanes, though the benefits are not evenly shared. Together, the papers show why data center policy is difficult. Data centers can bring local benefits, but they can also create housing, land-use, grid-cost, and equity concerns. The talk argues that policymakers should treat them not only as economic-development projects, but also as local infrastructure that affects households, housing markets, and electricity customers.

BRIEF PROFILE

Yueming (Lucy) Qiu is a professor, the Roy F. Weston Chair in Natural Economics, and associate dean for research and faculty affairs in the School of Public Policy at the University of Maryland College Park. Her research group focuses on using big data with quasi-experimental and experimental methods to answer empirical questions related to the interactions among consumer behaviors, low-carbon technologies and incentives. Her research projects have been funded by the National Science Foundation, the Sloan Foundation, Department of Defense, Electric Power Research Institute and Water Research Foundation. Qiu received her Ph.D. from Stanford University and B.S. from Tsinghua University. She has published in journals including The Review of Economics and Statistics, Journal of Environmental Economics and Management, Nature Energy, Nature Sustainability, Joule and Nature Communications. She is a recipient of the NSF CAREER award and the APPAM World Citizen Prizes in Environmental Performance. She served as the vice president of academic affairs of the United States

Association for Energy Economics (USAEE) and co-chair of the Association for Public Policy Analysis and Management (APPAM)'s Natural Resource, Energy, and Environmental Policy area.

KEYNOTE VI

Building a Regenerative Mindset for Nature-Positive Energy Supply Chains

Joseph Sarkis

Professor, Worcester Polytechnic Institute, USA

ABSTRACT

Professor Joseph Sarkis will present a vision, a prospective and desireable future, for moving beyond sustainability toward regeneration, exploring how a regenerative mindset can transform energy and broader supply chains into catalysts for nature-positive development, climate resilience, and long-term value creation. He will examine how regenerative thinking can address the interconnected challenges of climate change, resource scarcity, biodiversity loss, and systemic risk by reimagining supply chains as dynamic social-ecological systems. Drawing on emerging work in regenerative sustainability, circularity, resilience, sustainability analytics, and nature-positive development, Professor Sarkis will highlight how organizations can rethink the way they measure performance, allocate investment, and design supply chains — moving beyond the goal of simply reducing negative impacts toward actively restoring and enhancing the natural and social systems on which economies and energy systems depend.

BRIEF PROFILE

Professor Joseph Sarkis is a globally recognized scholar in sustainable operations and supply chain management and circular economy. A Clarivate Highly Cited Researcher for more than a decade, he has published more than 600 scholarly works. He is among the world's most influential researchers in sustainability and operations management. His research has significantly advanced understanding of sustainable supply chains, circular business models, digital technologies, and organizational strategies that support environmental and societal resilience. In this keynote, Professor Sarkis will present a vision for moving beyond sustainability toward regeneration, illustrating how a regenerative mindset can help transform general and energy supply chains into catalysts for nature-positive development. He will discuss creating resilient, regenerative thought addressing the interconnected challenges of climate change, resource scarcity, and biodiversity.

KEYNOTE VII

Driving Energy Security Through Transport Electrification: The Strategic Role of Emerging Economies

Haluk Sayar

President, the Eurasian E-Mobility Association, Turkey

ABSTRACT

Transport electrification is becoming a strategic pillar of energy security as well as climate policy. While discussions often focus on developed markets, emerging economies will largely determine the pace and success of the global energy transition. This presentation examines how transport electrification contributes to reducing energy import dependency, strengthening grid resilience through smart charging, accelerating renewable energy integration, and supporting industrial competitiveness. Drawing on international developments and the experience of Türkiye as a rapidly growing EV market connecting Europe, Asia and the Middle East, the presentation explores policy priorities, investment needs, charging infrastructure deployment, and regional cooperation required to accelerate the transition under increasing geopolitical uncertainty.

BRIEF PROFILE

Haluk Sayar is the President of the E-Mobility Eurasia Association and the Managing Director of Evira Consulting, specializing in energy transition, sustainable mobility, and clean energy policies. A mechanical engineer, he has more than 30 years of international experience in the energy sector, including leadership positions at Ecofys and KWA Contracting.

Mr. Sayar is the Organizing Committee Chair of the IAEE COP Symposium and the Conference Chair of the EVCharge Show, one of the leading international events dedicated to electric mobility and charging infrastructure. He previously served for three years as a Board Member of E-Mobility Europe, contributing to the advancement of electric mobility policies and international cooperation across Europe.

His work focuses on the intersection of energy security, transport electrification, charging infrastructure, renewable energy integration, and regional cooperation across Europe, the Middle East, Central Asia, and the Caucasus. As a frequent keynote speaker at international conferences, he actively contributes to policy dialogue and strategic initiatives supporting the global energy transition.