



Department of
Systems Engineering

香港城市大學
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Scalable Decision-Making in Sustainable Systems



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Abstract

Humans are facing many unprecedented environmental problems, such as waste pollution and climate change. Addressing these urgent issues calls for advanced decision-making frameworks to design, plan, and operate various infrastructures for waste valorization and energy transition with high efficiency and reliability. First, I will describe a unified optimization framework that enables the optimal design and operation of large-scale waste valorization infrastructures. This framework reveals the economic viability and environmental benefits of such infrastructures and informs policy implications such as pricing and revenue allocations. Second, I will outline an optimization framework that integrates smart electrification with manufacturing processes. This offers grid flexibility and smoothens the energy transition. Finally, I will present two algorithms and software we've developed to address these complex, large-scale decision-making challenges, leveraging graph theory, classical decomposition methods, and new computing architectures like GPUs. Future research directions, such as the coordinated management of food waste for flexible green electricity production in Hong Kong, will be discussed.

About the Speaker

Jiaze Ma is a fifth-year PhD candidate in the Department of Chemical Engineering at the University of Wisconsin-Madison, working under the supervision of Prof. Victor Zavala. He completed an internship at the Argonne National Laboratory in the Mathematics and Computer Science Division, guided by Dr. Kibaek Kim. Before starting his PhD, he also worked with Sinopec, contributing to an R&D project aimed at optimizing Sinopec's refinery cooling water system. His current research interests focus on developing optimization models, theories, algorithms, and software to address urgent energy and environmental challenges, such as waste valorization and energy transition. His work is characterized by its application-oriented and theoretical nature. He has authored 19 journal papers in top-tier journals and has received 400+ citations.