

The Hong Kong University of Science and Technology  
Dept of Information Systems, Business Statistics and Operations Management  
Dept of Industrial Engineering & Decision Analytics  
Joint Seminar Announcement



**Integrating EV Charging and  
Discharging into Power Grid Through  
Bilateral Negotiation**

by

**Prof. Yun Fong LIM  
Singapore Management University**

**Date** : **10 January 2025 (Friday)**  
**Time** : **10:30 – 11:45 AM**  
**Venue** : **Case Room 1001, LSK Business Building**

**Abstract:** To deal with demand uncertainty on a power grid, a power plant with limited ramping capability can collaborate with an electric vehicle (EV) company. With proper charging and discharging prices, the EV company voluntarily withdraws electricity from or returns electricity to the power grid in suitable phases. We model the two parties' interactions as a bargaining game on the prices, followed by the EV company's charging and discharging problem and the power plant's electricity generation problem. To solve this bargaining game, we propose a novel "Guess and Verify" approach. Specifically, we first find an optimal solution within a restricted price set in which the two parties' total cost is minimized, and then verify its global optimality. Under an equilibrium contract, we find that the power plant can reduce its expected cost from the collaboration. This is because the EV company fully charges in a low electricity demand phase, reducing the power plant's curtailment cost, and fully discharges to the power grid in a high electricity demand phase, lowering the power plant's electricity generation cost. Based on real data, our numerical experiments suggest that the EV company's charging and discharging can substantially harmonize the power flow within the grid and save significant cost, especially when the electricity demand gap across different phases increases or the power plant's ramping capability decreases. Surprisingly, the EV company's percentage cost saving can exceed 100%, implying that it can make a profit from the collaboration. For the power plant, the percentage cost saving is 2-7%.

**Bio:** Yun Fong LIM is Professor of Operations Management at the Lee Kong Chian School of Business, Singapore Management University (SMU). He has been a Chang Jiang Chair Professor, Lee Kong Chian Fellow, MPA Research Fellow, and NOL Fellow. Yun Fong's research has appeared in Operations Research, Management Science, Manufacturing and Service Operations Management, and Production and Operations Management. He has delivered keynote and plenary speeches in several international conferences. In addition, his work has received funding by MOE, A\*STAR, RGC-HK, and NNSF, and media coverage by Financial Times, The Business Times, CNA938, and Channel 8. His current research interests include online retailing (supply chains and fulfillment), online platforms (business model innovations), sustainable urban

systems, and flexible workforce and resource management. Yun Fong serves as Senior Editor for Production and Operations Management and Associate Editor for Naval Research Logistics. He has placed his PhD students and postdoc to CUHK (Shenzhen), USTC, SUSS, and ShanghaiTech as well as supervised some DBA students who lead influential firms in China.

At SMU, Yun Fong founded the OM PhD Program. He also served as Academic Director of the Master of Science in Management (MiM) Program in 2020-2023 and played an instrumental role in elevating the program from 83rd to 41st worldwide in the Financial Times Rankings. Yun Fong is a recipient of the SMU Teaching Excellence Innovative Teacher Award. He teaches both undergraduate and postgraduate courses in Operations Management. He has provided consulting service and executive development to corporations such as Alibaba, Maersk, McMaster-Carr Company, Resorts World Sentosa, Schneider Electric, Temasek Holdings, and Zalora. Yun Fong obtained both his PhD and MSc degrees in Industrial and Systems Engineering from the Georgia Institute of Technology.

All interested are welcome!  
Enquiries: Dept of ISOM