

# Speech Title

## Low-Carbon Maritime Multi-Energy and Transportation Systems

### SPEECH TITLE

Owing to the huge fuel consumption and serious air pollution caused by the shipping, extensive electrification of maritime transportation, represented by the seaport microgrids and all- electric ships (AESs), has become a new solution prevent the footprint of the greenhouse gas emissions. However, with the trend of electrification, the connections between the seaport and ships are no longer limited in the logistic-side, but also expanded to the electric-side, which makes the traditional maritime transportation system as a complex multi-energy-transportation coordination system. In this tutorial, three parts will be mainly introduced that are 1) Marine transportation and power system with renewables; 2) Optimal operation of multi-energy mobile microgrid, and 3) Resilient transportation and power network.

### MOTIVATION AND FOCUS

Maritime transportation has undertaken almost 90% global overseas trading logistics and correspondingly produces 3%-5% of the total global greenhouse gas emissions. However, to the best of our knowledge, the studies on the coordination of maritime transportation and energy system are new. Previous research separately considered the coupled systems. The topic of low-carbon maritime transportation and power system is novel and interesting to the I&CPS-Asia, which will occupy the empty of this area. The attracting scholars will be learnt about the concept, the latest technologies, the trend of the multi-energy maritime systems. The essential contribution of this tutorial is summarized as follows:

- 1) Marine transportation and power system with renewables. In this sub-section, the application the renewable into the seaport multi-energy system will be presented. Accordingly, the new configuration, energy planning methods, and optimal operation strategy of the seaport will be introduced.
- 2) Optimal operation of multi-energy mobile microgrid. In this sub-section, the application the renewable into the shipboard power system will be presented. Furthermore, the concept of the mobile microgrid will be overviewed with optimal allocation of on-board energy storage system and energy management for all-electric ships.
- 3) Resilient transportation and power network. In this sub-section, the probabilistic model of the transportation and power network will be introduced and some novel methods will be presented for a resilient transportation and power network.

### BRIEF CV OF SPEAKERS



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Prof. Yan Xu received the B.E. and M.E degrees from South China University of Technology, Guangzhou, China in 2008 and 2011, respectively, and the Ph.D. degree from The University of Newcastle, Australia, in 2013. He is now the Nanyang Associate Professor at School of Electrical and Electronic Engineering, Nanyang Technological University (NTU), and a Cluster Director at Energy Research Institute @ NTU (ERI@N), Singapore. Previously, he held The University of Sydney Postdoctoral Fellowship in Australia. His research interests include power system stability and control, microgrid, and data-analytics for smart grid applications. Dr Xu is an Editor for IEEE Transactions on Smart Grid, IEEE Power Engineering Letters, CSEE Journal of Power and Energy Systems, and an Associate Editor for IET Generation, Transmission & Distribution.



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