

# Life Cycle Optimization Models and Algorithms for Design and Operations of Sustainable Supply Chains

Fengqi You  
Northwestern University

## Abstract:

As evidenced by the pope's recent encyclical on climate change and the public's interests in carbon and water footprints, sustainability issues are becoming more prevalent in the thoughts and actions of more and more people around the world. The increasing awareness of sustainability issues has driven the industry and society to pursue more economically, environmentally and socially sustainable strategies in the design and operations of supply chains. Systematic methods based on computational optimization frameworks using a life cycle perspectives play an important role in this quest. These computational frameworks integrate life cycle analysis and technoeconomic assessment with multiobjective superstructure optimization to improve overall sustainability performance of the supply chains. This talk will explore some recent results on the development of large-scale mathematical programming models and algorithms for life cycle optimization of sustainable supply chains. We will specifically focus on two computational frameworks and their applications. The first one is concerned with the functional unit-based life cycle optimization of sustainable supply chains under economic and environmental criterions. The second one addresses the life cycle optimization in a decentralized, non-cooperative supply chains under a leader-follower game structure. We will discuss general modeling frameworks, efficient solution algorithms, and case studies on hydrocarbon biofuel and shale gas supply chains.

## Biography:

Fengqi You is an Assistant Professor of Chemical and Biological Engineering at Northwestern University. He received his PhD from Carnegie Mellon University and worked at Argonne National Laboratory as Argonne Scholar, before joining the faculty of Northwestern University. He has published 76 peer-reviewed journal articles, some of which have been editorially highlighted in *Nature*, featured on journal covers (e.g. *Energy & Environmental Science*), and covered by major media outlets (e.g. *The New York Times*, *BBC*, *BusinessWeek*, and *National Geographic*). He has received several competitive awards, including W. David Smith, Jr. Graduate Publication Award from the CAST Division of AIChE, Director's Fellowship from Argonne National Laboratory, and the 2013 Northwestern-Argonne Early Career Investigator Award. His research focuses on the development of novel computational models, optimization algorithms, and systems analysis tools for process engineering, energy systems and sustainability. More information about his research group can be found from the website: <http://you.mccormick.northwestern.edu>.

