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PROCESS SYNTHESIS IN THE ERA OF RENEWABLE ENERGY: NOVEL APPROACHES FOR NEW PROBLEMS

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Abstract: We discuss how process systems engineering (PSE) studies can facilitate the development of novel strategies for the production of renewable fuels and chemicals. Importantly, we show how PSE can be used to identify technological barriers and major cost drivers, and, ultimately, guide future research efforts. After an overview of the methods we have developed, we discuss the synthesis and analysis of two classes of systems: (1) biomass-to-fuels/chemicals strategies and (2) systems that employ solar energy for power and fuels generation. Finally, we discuss how the synthesis of integrated renewable energy systems leads, naturally, to new types of synthesis problems for which traditional approaches are insufficient; and outline progress towards the development of new methods to address these challenges.

Bio: Christos Maravelias is the Anderson Family Professor at Princeton University. Before joining Princeton, he was the Vilas Distinguished Achievement Professor at the University of Wisconsin-Madison. Christos obtained his Diploma from the National Technical University of Athens, an MSc. from the London School of Economics (London, UK), and his PhD from Carnegie Mellon University. His research interests lie in the general area of process and energy systems engineering and optimization. Specifically, he is studying production planning and scheduling, supply chain optimization, and chemical and energy systems synthesis and analysis with emphasis on renewable energy technologies.

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