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## Enabling next generation biofuels and bio-products for the emerging bio-economy

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Advances in biotechnology and the emerging bio-economy are providing a unique opportunity to revolutionize the production of renewable bio-based fuels and products, which will allow the future bio-economy to play a direct role in achieving greater carbon mitigation and sustainability goals-if the clean version of it can be realized. However, a combination of factors including low oil, commodity and carbon prices are altering the path of the bio-economy's emergence and are hindering efforts to achieve more ambitious climate goals. These factors are therefore forcing a rethinking of the strategy for transitioning from cheaper first generation to more expensive next generation biofuels and bio-products. This presentation will outline the social and economic environment in which the advanced bio-economy is emerging and will discuss and contextualize the challenges being faced in advancing clean and sustainable biotechnologies. The directed research efforts being supported and promoted by the U.S. Department of Energy and its Bioenergy Technologies Office (BETO) will be discussed, and BETO's strategies to support the evolution and emergence of the bio-economy on a sustainable path will be discussed. However, precisely how the bio-economy emerges is key, since the sustainability of bio-based fuels and products is critically dependent on specific agriculture and industrial practices. As an example of this, the sustainability and performance metrics BETO uses and is developing to assess advanced bio-manufacturing, bio-processing, and biofuel production will be presented. Further, the linkages between biotechnology development, next generation bio-product performance and the emergence of a sustainable bio-economy will be examined and will focus on the bio-economy's prospects for managing carbon as a function of bio-based fuel and product performance. Finally, BETO's efforts to more efficiently leverage biotechnologies to valorize second generation biomass resources, organic wastes and waste gases to produce renewable products and low carbon fuels will be outlined.

### Biography

David M Babson is a Technology Manager at Bioenergy Technologies Office (BETO), US Department of Energy. He oversees several projects for BETO's Conversion Program, and works to understand how to leverage new technologies to advance the bio-economy and to address global energy and climate challenges. Based in Washington DC, he has extensive research and policy experience. Before joining BETO, he advocated for sustainable transportation solutions as a Senior Fuels Engineer at the Union of Concerned Scientists, and served as an AAAS Science and Technology Policy Fellow at US Environmental Protection Agency, where he reviewed key initiatives like the renewable fuel standard. Before starting his fellowship, he completed Post-doctorate studies at University of Minnesota's Biotechnology Institute and US Naval Research Laboratory. He completed his PhD in Chemical and Biochemical Engineering at Rutgers University and a BS in Chemical Engineering at University of Massachusetts Amherst.

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