Ian Rowe, J Fundam Renewable Energy Appl 2017, 7:7 (Suppl)
DOI: 10.4172/2090-4541-C1-038



## Engineered carbon cycling strategies for advanced net-zero carbon Biofuels

**Ian Rowe**
U.S. Department of Energy Bioenergy Technologies Office, USA

Large-scale and rapid deployments of renewable power such as wind and solar are driving down both the carbon intensity and price of power. The transition to renewable power will help decarbonize every sector of the economy, which will increase environmental sustainability, energy security and economic competitiveness. However, grid integration challenges and disproportionate renewable power generation and use are preventing the most effective utilization of these resources and technologies to decarbonize fuel reliant sectors, such as the transportation sector, are not as advanced or readily deployable as wind and solar. Therefore, the U.S Department of Energy and its Bioenergy Technologies Office (BETO) are seeking to exploit the deployment of cheaper and cleaner renewable power to address these challenges and fundamentally change how organic carbon is synthesized from carbon dioxide. Specifically, one strategy that BETO is pursuing is re-imagining the carbon cycle without photosynthesis and it is exploring technologies that can efficiently leverage renewable power to productively utilize carbon dioxide to generate relevant organic chemical intermediates. This presentation will outline the social, economic and environmental implications of decoupling the production of renewable biofuels from the land sector by industrializing the non-photosynthetic conversion of carbon dioxide to useful products. Various technologies and specific system configurations to enable enhanced carbon cycling to offer land-sparing organic feedstock for the advanced bioeconomy and to create tools that leverage renewable power to increase overall system efficiency, manage carbon, address climate change and support advanced bioproduct pathways for new economic opportunities will be discussed. Also, relevant organic intermediates, based on thermodynamic efficiencies and biological upgrading potential will be examined and contextualized in terms of associated pathway scalability. Finally, BETO's efforts to exploit inexpensive power to supplement or reduce land use while generating low-carbon renewable biofuels as well as future opportunities and directions will be outlined.

### Biography

Dr. Ian Rowe is a Technology Manager with the Bioenergy Technologies Office (BETO) at the US Department of Energy. Working out of DOE Headquarters in Washington DC, Ian is responsible for a number of projects within BETO's Conversion program. His focus is primarily on biological strategies for generating biofuels and bioproducts, concentrating in molecular biology, organism development, and biophysics. Ian is active in BETO's efforts in carbon efficiency, the feedstock/conversion interface, and synthetic biology. He is a recipient of a STEM Presidential Management Fellowship. Prior to DOE, Ian received his PhD in Biochemistry from the University of Maryland for his work on bacterial membrane biophysics and a BS in Biochemistry from Millersville University.

Ian.Rowe@EE.doe.gov

**Notes:**