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Review



Indirect land use emissions in the life cycle of biofuels: regulations vs science

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Abstract: Recent legislative mandates have been enacted at state and federal levels with the purpose of reducing life cycle greenhouse gas (GHG) emissions from transportation fuels. This legislation encourages the substitution of fossil fuels with 'low-carbon' fuels. The burden is put on regulatory agencies to determine the GHG-intensity of various fuels, and those agencies naturally look to science for guidance. Even though much progress has been made in determining the direct life cycle emissions from the production of biofuels, the science underpinning the estimation of potentially significant emissions from indirect land use change (ILUC) is in its infancy. As legislation requires inclusion of ILUC emissions in the biofuel life cycle, regulators are in a quandary over accurate implementation. In this article, we review these circumstances and offer some suggestions for how to proceed with the science of indirect effects and regulation in the face of uncertain science. Besides investigating indirect deforestation and grassland conver-