

Abstract
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BIOBUTANOL
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World production of biofuels has experienced phenomenal growth. Various drivers for this phenomenon include high fuel prices, concerns about the environment, energy security and rural development. The majority of the growth in biofuels has been in the production of ethanol. However there are other biofuels, so-called second-generation biofuels that may offer some advantages over ethanol. Second-generation biofuels include cellulosic ethanol, covered in the PEP Report 263 *Cellulosic Ethanol* and the subject of this report biobutanol.

Biobutanol has a number of advantages over ethanol, has a higher heating value, it is more hydrophobic than ethanol and can be transported via pipeline integrated in the existing petroleum-based fuels infrastructure and it can be added to gasoline at higher levels without engine modification.

Biobutanol has garnered the interest not only in early stage companies such as Tetravita and Gevo, whose technologies are covered in this report, but also major oil and chemical companies. BP and DuPont have formed a JV to develop biobutanol as a gasoline additive.

This report covers the technological and economic aspects of the production of biobutanol via two processes. The first one is a modification of the established acetone-butanol-ethanol (ABE) fermentation developed by the University of Illinois and licensed to Tetravita. It incorporates an improved microorganism (*Clostridium beijerinckii* BA101) and a gas stripping system for in situ product removal (ISPR) originally covered in PEP Review 2007-1. The second process is based on a combination of patents from GEVO and DuPont. It incorporates a novel pathway for the production of isobutanol by a solvent-tolerant microorganism developed by Gevo and a recovery process based on a DuPont patent application. Neither process is commercial but is in the process demonstration phase.

We also include for reference a conventional corn dry mill for the production of ethanol as it is likely that if the biobutanol development program is successful some existing ethanol plants may be converted to biobutanol.

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BIOBUTANOL

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