
**Life Cycle Inventory Analysis of Sugarcane Ethanol:
Investigating Renewable Fuels Environmental Sustainability in
Brazil**

Marcelo Costa Almeida
CENBIO - Centro Nacional de Referência em Biomassa

José Roberto Moreira
CENBIO

SAE BRASIL

Filiada à

SAE International

**Congresso 2005
SAE BRASIL**

XIV Congresso e Exposição Internacionais
da Tecnologia da Mobilidade
São Paulo, Brasil
22 a 24 de novembro de 2005

**LIFE CYCLE INVENTORY ANALYSIS OF SUGARCANE ETHANOL:
INVESTIGATING RENEWABLE FUELS ENVIRONMENTAL
SUSTAINABILITY IN BRAZIL**

Marcelo Costa Almeida

Centro Nacional de Referência em Biomassa - CENBIO

José Roberto Moreira

Centro Nacional de Referência em Biomassa - CENBIO

Copyright © 2005 Society of Automotive Engineers, Inc

ABSTRACT

The Inventory Analysis for the life cycle of sugarcane ethanol is presented. Methodological problems related to the application of the Life Cycle Assessment methodology to agricultural systems are discussed and solutions are proposed, based on the literature. The system modeled is representative of the State of São Paulo/Brazil and includes an agricultural sub-system and an industrial sub-system. The agricultural sub-system includes all operations required for the production and the delivery of cane to the industrial sub-system. The industrial sub-system includes all processes for the production of sugar, alcohol (anhydrous and hydrous) and surplus power. The agricultural sub-system and its management practices covering the whole life cycle of sugarcane biomass is discussed in detail, since most of the environmental aspects occur in this sub-system. The consumption of fossil fuel, the consumption of water, the leaching of nutrients from the soil, the atmospheric emissions, and the residues and effluents management are assessed per tonne of hydrous and anhydrous ethanol. This study aims to contribute to the Brazilian effort to create a National Life Cycle Inventory Database and to support public policies related to renewable fuels.