

Contact:
Independent Institute for Environmental Issues (UfU)
 German Office: Greifswalder Str. 4, 10405 Berlin, Germany
 fabian.stolpe@ufu.de
 www.ufu.de
 Hanoi Office: VINACOMIN Tower, Room 1102, 11th Floor
 03 Duong Dinh Nghe, Yen Hoa, Cau Giay, Hanoi, VN

Potential climate effects of cassava-based bioethanol use in Vietnam

METHODOLOGICAL FRAMEWORK

There is currently no bioethanol factory in operation in Northern Vietnam. However, there is a bioethanol factory under construction in the Phu Tho province which is at a distance of approximately 290 km from the pilot site in Thai Nguyen Province. Therefore, bioethanol production was taken into account as potential conversion facility for the hypothetical scenario. The energy production chain for the scenario is as follows: Cultivation of cassava on the pilot site in Dai Tu, Thai Nguyen Province, use of cassava as ethanol feedstock in the ethanol factory of Phu Tho and use of ethanol for E5 gasoline blending.

For the evaluation of potential GHG emissions from the scenario, the GHG emissions were calculated using the Lifecycle Assessment (LCA) approach. For the cassava-based ethanol production, the stages of the value chain included in the LCA (system boundaries) are land use change; cassava cultivation; chipping; feedstock production; transformation and delivery to the ethanol plant; biomass processing into biofuels; and biofuel transportation, storage and distribution.

RESULT

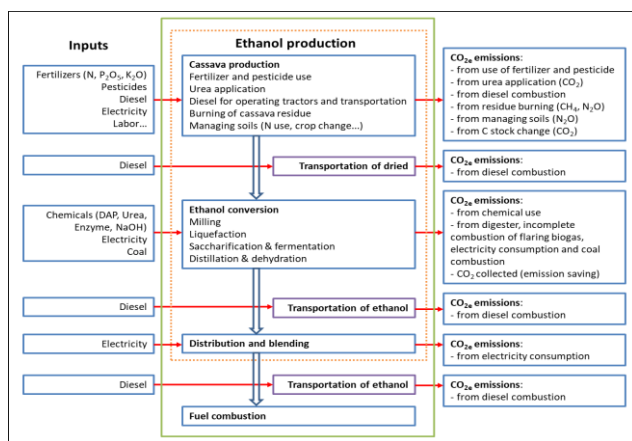
Total GHG emissions for ethanol produced from cassava cultivated at the Nui Phao pilot site in Dai Tu are 47.69 g CO₂eq/MJ ethanol, of which 64% of the contribution come from ethanol processing and 28% from cassava cultivation.

	Cassava-based ethanol (1)	RON92 Gasoline (2)	Saving = -[(2)-(1)]/(2)
	g CO ₂ eq/MJ EtOH	g CO ₂ eq/MJ gasoline	
LUC	-0.000149		
cultivation	13.115040		
transport	2.905808		
processing	30.695734		
use	0.973295		
total	47.69	94.00	46.31 g CO ₂ eq/MJ 49.3 %

This means that the use of E5 and E10 produced from cassava cultivated on former mining sites as a substitute for gasoline would achieve a significant GHG emissions reduction.

The GHG emissions from ethanol production were calculated according to the guidelines from Bio-Grace and the European Commission as follows:

Emissions data from the cultivation process (e.g. yields, fertiliser) + emissions data for conversion (e.g. heating values, emission factors) = GHG emissions (incl. direct and indirect emissions)



LCA steps of ethanol production and utilisation (system boundaries for the LCA)

The total GHG emissions from the production and use of bioethanol for transport are about 50.7% of total GHG emissions compared to gasoline (RON92) emissions or, vice versa, bioethanol production from cassava cultivated on former mining sites and its use can achieve 49% of GHG emission savings in comparison to the use of RON92 gasoline.