

Table 11. Net greenhouse gas (GHG) savings per energy equivalent liter of biofuels used in lieu of fossil fuels. All values are expressed in CO₂ equivalent g/MJ.

	Total life cycle GHG emissions from the fossil fuel that is displaced *	Fossil fuel GHG emissions avoided by using biofuel instead of fossil fuel †	Farm N ₂ O emissions in biofuel production ‡	Farm CH ₄ mitigation in biofuel production §	Farm CO ₂ liming emissions in biofuel production ¶	Net GHG emissions saved by producing and using biofuel	Net fraction of GHG emissions saved by producing and using biofuel
Corn grain ethanol	96.90	19.66	5.60	0.43	2.48	12.02	12.4%
Soybean biodiesel	82.32	39.76	4.72	0.36	2.09	33.32	40.5%

* This is the total life cycle GHG emissions of gasoline (for corn grain ethanol) or diesel (for soybean biodiesel) (37).

† This is the total life cycle GHG emissions from the fossil fuel that is displaced multiplied by the fossil fuel displacement rate of the biofuel, which is defined as $1 - \frac{1}{\text{NEB Ratio}}$. This accounts for the net energy gain from each biofuel but not the GHG release (N₂O) or mitigation (CH₄) in crop production, which are estimated in the following two columns.

‡ With conventional tillage on a corn/soybean/wheat rotation farm, CO₂ equivalent N₂O emissions are 52 g/m² (38). As 3,632 L of corn grain ethanol and 544 L of soybean biodiesel are produced per hectare, 143 and 955 g of CO₂ equivalent N₂O are released per L of ethanol and biodiesel, respectively. With a low heat value of 21.26 MJ/L for ethanol and 32.93 MJ/L for biodiesel, 6.73 and 29.03 g of CO₂ equivalent N₂O are released per MJ of ethanol and biodiesel, respectively. As in Table 10, 83.1% of this 6.73 g for corn farming is allocated to ethanol, and 16.3% of this 29.35 g is allocated to biodiesel.

§ Calculations are the same as for N₂O except that rather than release GHG, these agricultural practices mitigate 4 g/m² of CO₂ equivalent CH₄ emissions (38).

¶ Calculations are the same as for N₂O and CH₄ except for that these agricultural practices cause CO₂ emissions of 23 g/m² from liming (38).

|| Net GHG emissions saved by producing and using biofuel equals the fossil fuel GHG emissions avoided minus the farm N₂O and liming emissions in biofuel production plus the farm CH₄ mitigation in biofuel production.