Table 3. Energy to produce machinery and capital used on a representative 120 ha farm with a corn/soybean crop rotation.

	Weight of equipment	Production energy [†]	Annual machinery and capital energy per ha [‡]	Equipment energy per unit of biofuel production [§]	
	Mg	*GJ*	*MJ/ha/yr*	*MJ/L*	
				Ethanol	*Biodiesel*
Tractor - large	10.2	383	210	0.029	0.193
Tractor - small	5.6	210	115	0.016	0.106
Field cultivator	2.4	89	49	0.007	0.045
Chisel plow/ripper	3.6	134	74	0.010	0.068
Planter	3.4	128	70	0.010	0.064
Combine	11.9	445	244	0.034	0.224
Soybean combine head	2.8	104	57	0.008	0.052
Corn combine head	3.6	136	75	0.010	0.069
Gravity box (x 4)	6.6	248	136	0.019	0.125
Auger	0.8	28	15	0.002	0.014
Grain bin (x 3)	9.5	358	197	0.027	0.181
Irrigation	4.8 *	179	98	0.014	0.090
Sprayer	0.5	17	9	0.001	0.008
Agricultural buildings	9.1	341	187	0.026	0.172
Total		2,800	1,538	0.212	1.414

* We assume that 15% of farms have two 50 ha center pivot irrigation systems (3).

[†] For each piece of machinery and equipment, we assume for purposes of calculating its embodied energy that it consist entirely of steel. It takes 25 MJ/kg to produce steel (17, 18), and an additional 50% energy use for assembly (2).

[‡] All items are assumed to have a service life of 15 years.

[§] We use figures of 3,632 L of ethanol and 544 L of biodiesel produced per hectare.