1.Some tables of sweet sorghum-based fuel ethanol:

Energy consumption:

Table 5-1 Energy consumption during Sweet sorghum cultivation stage

Input materials	Nitrogen fertilizer	Phosphate fertilizer	Potash	herbicide	Insecticide	Diesel	lime	total
Unit	kg	kg	kg	kg	kg	L	kg	
Input amount (unit/ ha)	211.40	63.20	54.00	5.04	0.75	67.00	28.00	
Energy intensity (MJ/unit)	46.50	7.03	6.85	266.56	284.82	44.13	7.30	
Energy input (MJ/ ha)	9830.10	444.30	369.90	1343.46	213.62	2956.71	204.40	15362.48
Percent%	63.99%	2.89%	2.41%	8.75%	1.39%	19.25%	1.33%	100.00%

Table 5-2 Energy consumption for transportation of Sweet sorghum fuel ethanol

Sweet sorghum fuel ethanol	Items	Transport	Units	Input
Transport raw materials to ethanol production factory	Transport distance	highway	km	88.00
	Energy intensity	highway	MJ/L	44.13
	Fuel consumption intensity	highway	L/t.km	0.05
	Fuel energy consumption intensity	highway	MJ/t·km	2.21
		railway		0.077
	Raw material transportation energy input		MJ/t raw material	194.17
	Conversion rates		t raw material /t fuel ethanol	1:16
	Converted to ethanol		MJ/t fuel ethanol	3106.75
Factory to distribution site	Transport distance	highway	km	100.00
		railway		500.00
	Energy input		MJ/t fuel ethanol	259.15
Total			MJ/t fuel ethanol	3365.90

Table 5-3 Energy consumption for fuel ethanol production

Stage	Energy Consumption				By-product energy supply
	Electricity kwh/t ethanol	Steam t/t ethanol	Coal t/t ethanol	Heat air t/t ethanol	Solid particulate fuel t/t ethanol
Pretreatment	95.00				
Solid fermentation	50.00	0.20			
Continuous steaming-rectification	25.00	2.40			

Molecular sieve dehydration	40.00	1.90			
Slag deep processing	143.00			49.88	
Auxiliary equipment	20.00		0.61		
By-product production	106.00				1.18
transsexual	7.42				
Total	486.42	4.50	0.61	49.88	1.18
Energy intensit（MJ/t）	3.60	2637.61	29270.00	98.70	14670.00
Total energy（MJ/t ethanol）	1751.10	11869.25	17889.82	4923.58	17310.60
Net energy consumption（MJ/t ethanol）	19123.15				

Emissions:

Environmental emissions during the planting stage of sweet sorghum are mainly caused by pesticides, fertilizers and power energy. According to the quantity of each substance input in the planting stage of sweet sorghum (Table 5-1) and the corresponding emission parameters of each substance (Table 5-4), the emission of various substances produced per unit area in the planting stage of sweet sorghum (Table 5 -5) can be obtained. It can be seen from the table that N fertilizer emissions are the largest contributor to the sweet sorghum planting stage, followed by herbicides and diesel.

NOTE：VOC（Volatile Organic Compounds）、CO（Carbon monoxide）、CO_2（carbon dioxide）、CH4、NOx，N_2O、SOx and PM10.

Table 5-4 Emissions during the Sweet sorghum cultivation stage (g/ha)

Input	Nitrogen fertilizer	Phosphate fertilizer	Potash	herbicide	Insecticide	Diesel	lime	total
VOC	1386.27	6.30	31.48	69.86	12.86	72.87	0.11	1579.76
CO	299.26	39.18	17.06	64.88	14.69	118.68	0.67	554.42
NO_X	1038.46	164.32	41.96	486.38	84.77	184.05	1.86	2001.79
PM_{10}	370.17	13.08	8.83	166.78	26.71	16.36	0.16	602.09
SO_X	1847.51	40.75	200.29	504.02	79.27	1.47	0.23	2673.53
CH_4	345.51	74.48	36.07	161.05	26.55	1.34	0.88	645.87
N_2O	14.61	0.92	0.43	1.18	0.21	5.03	0.01	22.39
CO_2	458771.82	27309.52	24283.80	118421.70	18987.42	214363.82	542.44	862680.53

Table 5-5 Emissions for the transportation of Sweet sorghum (g/t ethanol)

Diesel	VOC	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions	4.79	7.79	12.09	1.07	0.10	0.09	0.33	14077.62

Table 5-6 Emissions for the transportation of Sweet sorghum for 1 ton fuel ethanol production(g/t ethanol)

Diesel	VOC	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions	76.57	124.70	193.39	17.19	1.55	1.41	5.28	225241.98

Table 5-7 Emissions for the transportation of ethanol by truck(g/t ethanol)

Diesel	VOC	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions	5.44	8.86	13.74	1.22	0.11	0.10	0.38	15997.30

Table 5-8 Emissions for the transportation of fuel ethanol by diesel locomotive (g/t ethanol)

Diesel	VOC	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions	1.00	1.63	2.53	0.22	0.02	0.02	0.07	2941.90

Table 5-9 Emissions for the transportation of fuel ethanol electric locomotive(g/t ethanol)

Electricity	VOC	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions	0.01	0.09	1.15	0.11	2.75	0.01	0.01	896.03

Table 5-10 Emissions for the Fuel ethanol production(g/t ethanol)

Input	VOC	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Coal	16.30	1631.50	3588.97	214.93	10190.19	19.01	12.90	1647631.10
Steam	6.46	188.84	768.65	13.58	4355.20	933.51	2.59	565695.00

Table 5-11 Emissions for the distribution of fuel ethanol(g/t ethanol)

Electricity	VOC	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions	0.00	0.04	0.47	0.05	1.12	0.00	0.00	366.73

Table 5-12 Cost analysis of the stage of growth and transport of Sweet Sorghum

Stage	Substage	Cost items	Price（yuan/ha）
Planting	farming		
		Land rent	3468.00
		seed	867.00
		Mulch	564.13

		Fertilize	1535.17
		Agricultural machinery	1376.80
		irrigation	716.72
		Wages	2427.60
		other	43.93
	acquisition		0.00
		Harvesting costs	693.60
		Bundle material fee	346.80
Transportation		Fuel consumption and labor	742.15
合计			12781.89

Table 5-13 Cost analysis of the production and distribution of fuel ethanol

Stage	Items	subitems	Price（yuan/t）
Fuel ethanol production cost			
	stalk raw material cost		3418.00
	Accessories cost	Glucoamylase etc.	208.08
	Water cost		152.59
	Electricity cost		282.06
	Steam cost		156.75
	Labor cost		242.76
	Depreciation		369.92
	By-product offset costs	Pellet fuel	1005.72
Fuel ethanol distribution	Distribution cost		12.00
Unit cost of ethanol			3836.28

The value of the production and investment ratio of the fuel ethanol produced by sweet sorghum refers to the ratio of the sales value of fuel ethanol per unit mass to the cost input of each stage of the production unit of the quality ethanol of fuel sorghum fuel. The sales price of fuel ethanol is uniformly 5,000 yuan / t. The value input of the whole life cycle of sweet sorghum fuel ethanol production is 3838.28 yuan / t. Therefore, the value of the production-investment ratio of sweet sorghum fuel ethanol is 1.30.

2.Some tables of cassava-based fuel ethanol:

Table 5-14 Energy consumption during cassava cultivation stage

Input	Nitrogen fertilizer	Phosphate fertilizer	Potash	herbicide	Insecticide	Diesel	lime	total
Unit	kg	kg	kg	kg	kg	L	Kwh	
Input amount (unit/ ha)	100	100	200	0.6	1.2	44	90	

Energy intensity (MJ/unit)	46.5	7.03	6.85	266.56	284.82	44.13	3.6	
Energy input (MJ/ ha)	4650	703	1370	159.936	341.784	1941.72	324	9490.44
Percent%	49.00%	7.41%	14.44%	1.69%	3.60%	20.46%	3.41%	100.00%

Table 5-15 Energy consumption for transportation of cassava fuel ethanol

Cassava fuel ethanol	Items	Transport	Units	Input
Transport raw materials to ethanol production factory	Transport distance	公路	km	100.00
	Energy intensity		MJ/L	44.13
	Fuel consumption intensity		L/t.km	0.05
	Fuel energy consumption intensity		MJ/t·km	2.21
	Raw material transportation energy input		MJ/t raw material	220.65
	Conversion rates		t raw material /t fuel ethanol	2.90
	Converted to ethanol		MJ/t fuel ethanol	639.89
Factory to distribution site	Transport distance	highway	km	100.00
		railway	km	500.00
	Energy input	highway	MJ/t·km	2.21
	Energy input	railway	MJ/t·km	0.08
	Energy input		MJ/t fuel ethanol	259.15
Total			MJ/t fuel ethanol	899.04

Table 5-16 Energy consumption for fuel ethanol production

Stage	Energy Consumption		
	Electricity kwh/t ethanol	Steam t/t ethanol	Coal t/t ethanol
Crush and mix	30.29		
Liquefaction and saccharification	12.98	0.72	
Fermentation	41.97		
Distillation	24.28	2.31	
Post-processing	70.58	0.79	
Auxiliary equipment	19.83	0.07	0.54
transsexual	7.42		
Total	207.35	3.89	0.54
By-product supply FE_5	205.06	3.89	
Net consumption	2.29		0.54
Energy intensity	3.6 MJ/kWh	2637.61 MJ/t	29270 MJ/t
Net energy consumption (MJ/t ethanol)	8.23		15893
Total net energy consumption (MJ/t ethanol)		15901.23	

Input N fertilizer P fertilizer K fertilizer Herbicide Diesel Electricity Pesticide Total

Table 5-17 Emissions during the cassava cultivation stage

Input	N fertilizer	P fertilizer	K fertilizer	Herbicide	Diesel	Electricity	Pesticide	Total
VOC	655.76	9.97	116.60	8.32	47.85	0.45	20.58	859.53
CO	141.56	62.00	63.20	7.72	77.94	3.69	23.50	379.61
NO_X	491.23	260.00	155.40	57.90	120.87	47.88	135.63	1268.91
PM_{10}	175.10	20.70	32.71	19.85	10.74	4.77	42.74	306.62
SO_X	873.94	64.47	741.80	60.00	0.97	114.12	126.84	1982.14
CH_4	163.44	117.85	133.58	19.17	0.88	0.36	42.47	477.75
N_2O	6.91	1.46	1.59	0.14	3.30	0.45	0.34	14.19
CO_2	217016.00	43211.27	89940.00	14097.82	140776.24	37210.68	30379.87	572631.89

Table 5-18 Emissions for the transportation of cassava

Diesel	VOC	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions	5.44	8.86	13.74	1.22	0.11	0.10	0.38	15997.30

Table 5-19 Emissions for the transportation of cassva for 1 ton fuel ethanol production

Diesel	VOC	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions	15.77	25.68	39.83	3.54	0.32	0.29	1.09	46392.17

Table 5-20 Emissions for the transportation of ethanol by truck

Diesel	VOC	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions	5.44	8.86	13.74	1.22	0.11	0.10	0.38	15997.30

Table 5-21 Emissions for the transportation of fuel ethanol by diesel locomotive

Diesel	VOC	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions	1.00	1.63	2.53	0.22	0.02	0.02	0.07	2941.90

Table5-22 Emissions for the transportation of fuel ethanol electric locomotive

Electricity	VOC	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions	0.01	0.09	1.15	0.11	2.75	0.01	0.01	896.03

Table 5-23 Emissions for the Fuel ethanol production

Input	VOC	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Electricity	0.01	0.09	1.22	0.12	2.90	0.01	0.01	945.56
Coal	14.48	1449.45	3188.50	190.95	9053.13	16.89	11.46	1463782.21

Table 5-24 Emissions for the distribution of fuel ethanol

Electricity	VOC	CO	NO_X	PM_{10}	SO_X	CH_4	N_2O	CO_2
Emissions	0.00	0.04	0.47	0.05	1.12	0.00	0.00	366.73