

I Overview of biomass energy market in China

I-1 Position of China's biomass energy market in the world

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Now, China is the third largest producer of fuel ethanol, but has fallen far behind other countries in development of other biomass energy products.

➤ Fuel ethanol

It is estimated that the output of fuel ethanol in China only accounted for █% of the world total █ million in 2009.

Table I-1.1 Top fuel ethanol production countries in the world

Country	Output (tonnes, 2009)	Raw materials	Legal standard
US	█	█	E10
Brazil	█	Sugar cane	█
China	1,620,000	█	█
Canada	█	█	█
Germany	█	Wheat, sugar beet	█
French	868,000	█	E5, E10

Source: CCM International

II-2 Feedstock supply

II-2.1 For fuel ethanol

➤ Cassava

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Compared with other raw materials, cassava is a more preferable raw material to produce alcohol.

Table II-2.1.5 Economic benefit comparison of alcohols production using different raw materials in China, 2009

Item	Cassava	Sugarcane	Corn	Wheat	Sweet potato
Price of RM (USD/t)	█	█	█	331.87	█
Unit consumption (tonne)	7	█	█	█	8.7
Cost of RM (USD/t)	█	834.60	█	█	█
Process cost (USD/t)	█	█	█	█	█
Cost of producing alcohol (USD/t)	█	█	█	█	754.06
Price of alcohol (USD/t)	█	█	761.35	█	█
Profit (USD/t)	182.99	█	█	█	█

Source: CCM International

➤ Other potential non-grain feedstock

Besides raw materials mentioned above, sugar cane, sweet grass, sweet sorghum may be choices to produce fuel ethanol as non-grain feedstock.

Table II-2.1.9 General information of other potential non-grain feedstock for fuel ethanol production in China

Raw material	Planting area (ha. 2008)	Unit consumption (t/t)	Main applications	Future prospect in fuel ethanol
Sugar cane				
Sweet sorghum		16	Sugar slab, brown powdered sugar and white granulated sugar	
Sweet grass	N/A			Basically not used

Source: CCM International

➤ Other potential energy crops

Besides jatropha curcas, yellow tree, swida wilsoniana, xanthoceras sorbifolia will be potential energy crops to produce biodiesel in the future in China.

Table II-2.2.2 Other potential energy crops for biodiesel in China

Raw material	Potential planting area (ha.)	Distribution	Unit yield (tonne/ha.)	Potential capacity (t/a)	Production cycle (year)
Xanthoceras sorbifolia			4.5~9.0		
Swida wilsoniana		Shaanxi, Shanxi, Hubei, Henan			
Yellow tree	300,000			900,000	

Source: CCM International

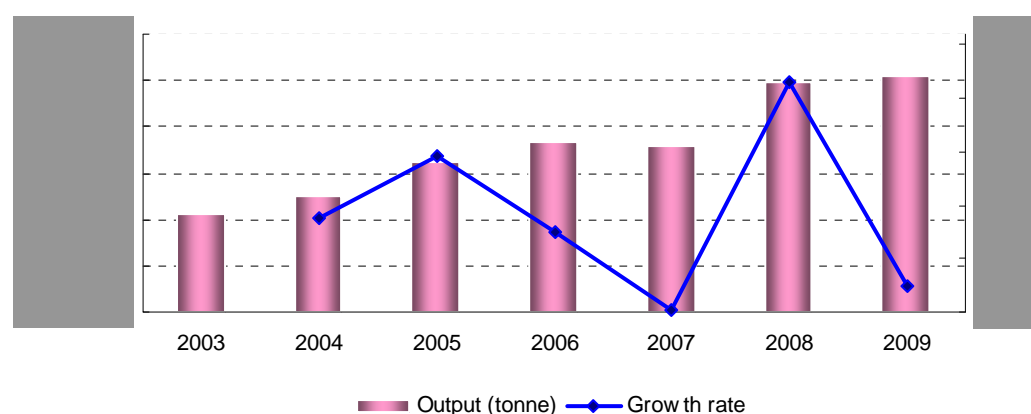
II-3 Production situation by products

II-3.1 Fuel ethanol

➤ Production

With the largest output in all biofuels, China's fuel ethanol industry witnessed fast development in past few years. By the end of 2009, the capacity of fuel ethanol is

Figure II-3.1.1 Output and growth rate of fuel ethanol in China, 2003-2009



Source: CCM International

➤ Manufacturers

By the end of 2009, only seven active manufacturers are involved in fuel ethanol production in China, five of which are national designated production bases.

Table II-3.1.1 Basic information of key fuel ethanol manufacturers in China, 2009

No.	Name	Abbreviation	Ownership	Raw materials	Capacity '09 (t/a)	Output '09 (tonne)
1					600,000	
2		Jilin Fuel Alcohol				
3				Corn	440,000	
4			State-owned			180,000
5				Cassava		
6	Sichuan Yangming Energy Technology CO., Ltd.			Sweet potato	50,000	
7			Private			1,500
Total		-	-	-		

Source: CCM International

III-2 Feedstock supply

III-2.1 Straw-fired power generation

The straw-fired power generation needs large quantities of straw resource, and only large-scale utilization can create obvious economic returns.....

Cost analysis of collection, transport and storage of straw

Table III-2.1.6 Trend comparison of bio-power cost

Item	Unit	25 MW straw-fired		6 MW bio-gasification	
		Before 2005	After 2006	Before 2005	After 2006
Generating capacity	kW	25,000			6,000
Running time	h/Y		6,500		
IURE	%				8
Electricity for sales	Million kWh/Y	146.25			
Biomass consumption	Kg(dry)/kWh			1.25	
Moisture content	%		15		
Raw material price	USD/t		43.92		
Raw material consumption	t/Year				
Raw material cost	Million USD/Y	5.58			2.27
Salary	USD/Y				
Operation cost	USD/Y		1,420,205	292,826	
Total cost	Million USD/Y				2.95
Electricity selling price	USD/kWh		0.0747		

Note: IURE, Internal use rate of electricity

Source: GIEC/CCM International

IV Solid biofuel market

IV-3 Achievements

Table IV-3.3 Main manufacturer and index of screw extrusion machine

No.	Manufacturer/Research institute	Machine type	Efficiency (kg/h)
1			120~150
2	Shaanxi Wugong Light-Industry Machinery Factory		
3		JX-11	
4			120~140
5	Planning and Design Institute of Ministry of Agriculture		
6		ZBJ-11	

Source: GIEC/CCM International

VII-2 Competitiveness analysis

➤ Fuel ethanol

Large state-owned companies, such as COFCO, CNPC and Sinopec Corp., control the whole fuel ethanol industrial chain in China. COFCO has three subsidiaries for fuel ethanol production, and CNPC has two subsidiaries.

Table VII-2.1 Comparison of the 3 state-owned ethanol producers in China, 2009

Company name	Subsidiary	Raw material	Capacity '09 (t/a)	Current situation	Strategy for fuel ethanol
COFCO		Corn		Major producer and the largest shareholder of fuel ethanol	COFCO plans to take up 60% fuel ethanol capacity in China by 2010, mainly using cassava from
	Zhaodong				
	COFCO		200,000	Wholly owned by COFCO. The only fuel ethanol producer using cassava as raw material.	
CNPC			600,000		Henan Tianguan to develop commercial production of second-generation fuel ethanol.
	Jilin Fuel Alcohol			CNPC is the largest shareholder. It is the second largest fuel ethanol producer in China.	
Sinopec Corp.		N/A	N/A		plans to establish fuel ethanol production line in Central China, using sweet potato as material.

Source: CCM International