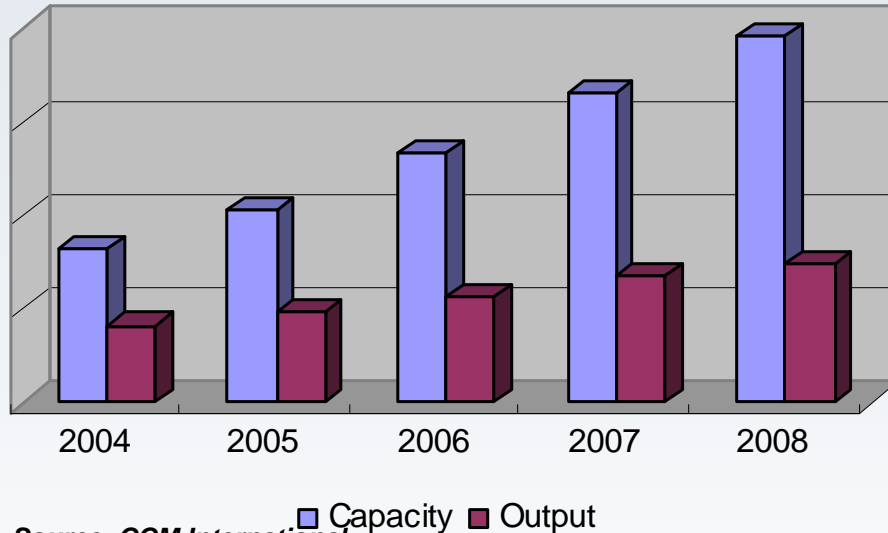




## Production development of MCA industry in China in past few years

MCA capacity and output in the past 5 years (capacity: t/a; output: tonne)



Source: CCM International

- CAGR of MCA capacity and output were about [redacted] % and [redacted] % respectively in 2004~2008,
- MCA capacity grew faster than its output, meaning that operating rate was decreasing.

- Driven by prosperous consumer electronics industry in 21st century, demand for flame retardant polymer material grows rapidly in Asia, especially Japan, Korea, mainland China and Chinese Taipei, thus creating large market space for all kinds of flame retardant.
- With similar production equipment, some melamine pyrophosphate (MPP) flame retardant producers participate in MCA production
- Higher requirement for environmental protection results in larger demand for environmentally friendly flame retardants, such as MPP, red phosphorus, MCA, etc.

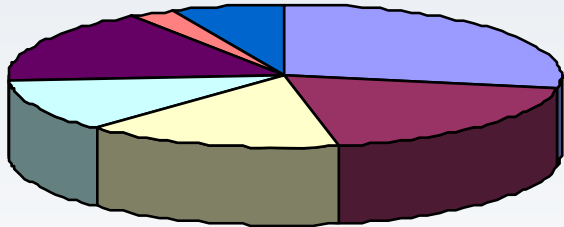


## Introduction to current MCA production

### MCA capacity, output and distribution

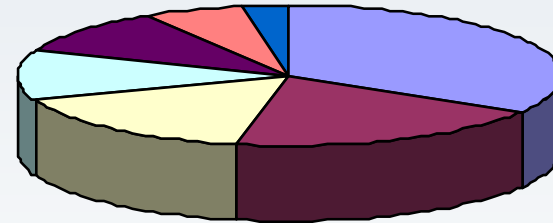
- Total capacity █████ t/a in 2009 and total output █████ tonnes in 2008

Distribution of MCA capacity in China



Source: CCM International

Distribution of MCA output in China



Source: CCM International

- Though MCA plants can be found in China's 10 provinces, output mainly concentrates in Sichuan, Shandong, Hebei, Jiangsu and Zhejiang.



## Current active and idle producers

No.	Abbreviation	Status	Capacity '09(t/a)	Capacity '08 (t/a)	Output '08(t)	Output '07 (t)	Price in June 09 (USD/t)
1		active					
2	Shandong Weidong	active					
3		active				2,500	
4		active					
5		active					
6		active		900			
7		active					
8		active	1,000				
9		active					1,493
10		active					
11		active			200		
...	.....	.....	.....	.....	.....	.....	.....
<b>Total</b>							-

Source: CCM International



## Key findings for MCA production in China

### Production scale and concentration ratio

Producers grading by their capacity in 2009 and their total output in 2008

Capacity in 2009	Number of producers	Total capacity (t/a)	Total output in 2008 (t)
≥5,000t/a	4		
1,000~2,000/a			2,700
<1,000		3,000	

- ✓ █% producers produced near █% MCA  
Most producers have capacity of 1,000~2,000t/a

Source: CCM International

Capacity in 2009 and output in 2008 of MCA in top 5 and top 10 producers in China

	Total capacity (t/a)	Percentage (%)	Output (t)	Percentage (%)
Top 5				
Top 10				

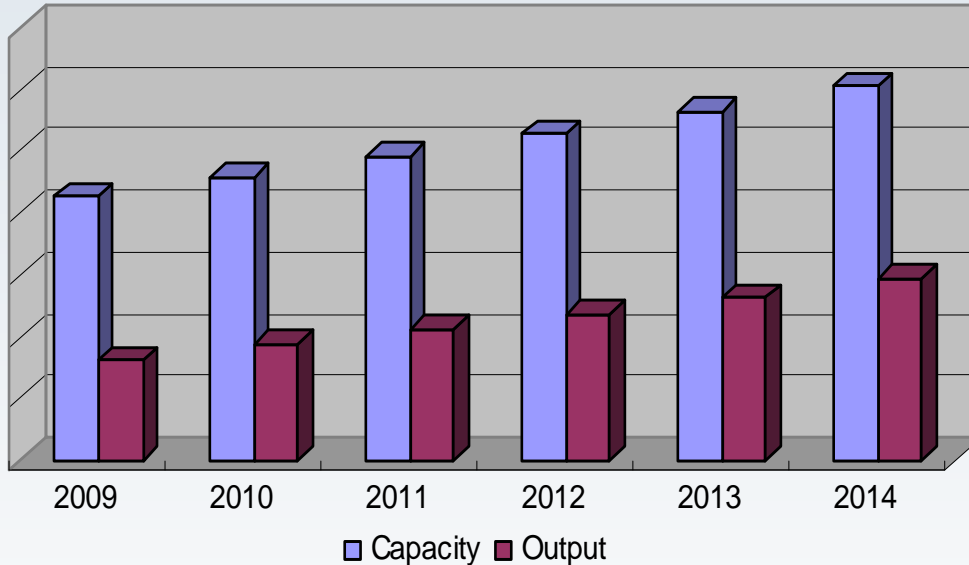
Source: CCM International

- ✓ China's MCA production concentrates in a few producers  
Top 5 and top 10 producers produced nearly █% and over █% of China's total MCA, though they own █% and █% of total capacity respectively in 2009, suggesting the scale effect characteristic of MCA industry.



## Production forecast to 2014

Estimated MCA capacity and output in China, 2009~2014, (capacity: t/a, output: tonne)



➤ With increasing demand from both domestic and overseas, CAGR for MCA capacity and output is estimated to be  $\blacksquare\%$  and  $\blacksquare\%$  respectively in 2009~2014, lower than that in past 5 years.

➤ Capacity growth will be slower than output, meaning that operating rate is expecting to rise in the future.

Source: CCM International

- It is estimated that some small producers (current capacity < 1,000 t/a) and medium scale producers (1,000 t/a  $\leq$  current capacity < 2,000 t/a) will quit MCA production, and some other medium scale producers will expand their production, but all the large producers will keep expanding production to maintain their advantages.
- More and more foreign companies will locate their MCA production line in China, for cheap labor force, sufficient raw materials, relatively low requirements for environmental protection. Another reason is that most of their end users are located in Asia.



## Comparison of unit cost raw material between two different routes

Route		Cyanuric acid route		Urea route	
Raw material	Unit price (USD/t)	Unit consumption (t/t)	Unit cost (USD/t)	Unit consumption (t/t)	Unit cost (USD/t)
Urea	241	-	-		
Melamine					613
Cyanuric acid			476	-	-
<b>Total</b>		1.04			

*Source: CCM International*

Note: Unit prices for MCA raw materials here are ex-factory prices quoted from major producers in June 2009. Taking the freight into account, the unit price may vary greatly from one region to another, especially for urea.