

# Ammonia Construction Record and Comments on Ammonia Fuel

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Ammonia Fuel Conference  
San Francisco, October 2007

# Moranbah, Queensland



## **Some Supply-Side Facts**

- 165 mm mty, 85% N-fertilizer, 15% other
- Growth ~ 1.8% py -- will likely continue
- ~ 20 mm mty ocean trade
- 35,000 tonne vessels
- Fertilizer side to perhaps set the fuel price
- 5 plants per year being built -- getting bigger
- 18 plants currently under construction
- Middle East/China are the construction leaders
- China is the gasification leader
- 6 or 7 studies underway in North America
- Current plant prices



# Karatha, Western Australia





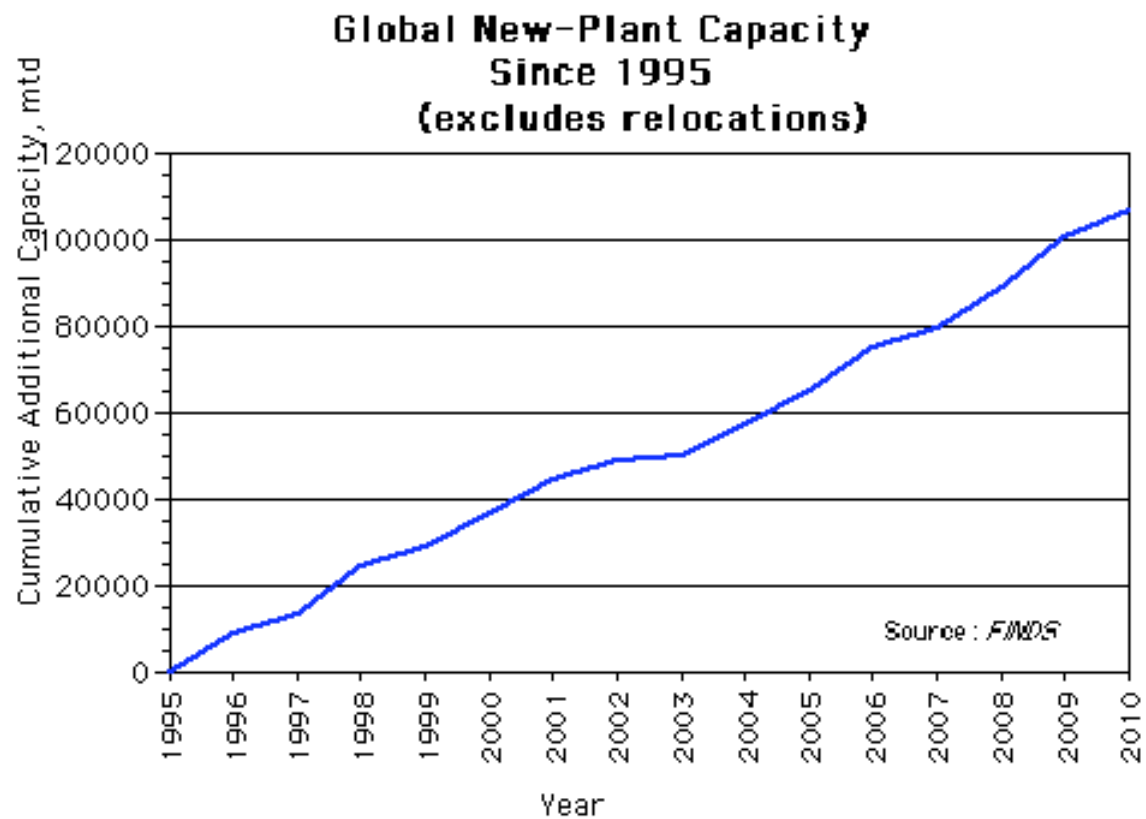
# Dampier Pier, WA



# Seawater Cooling Towers

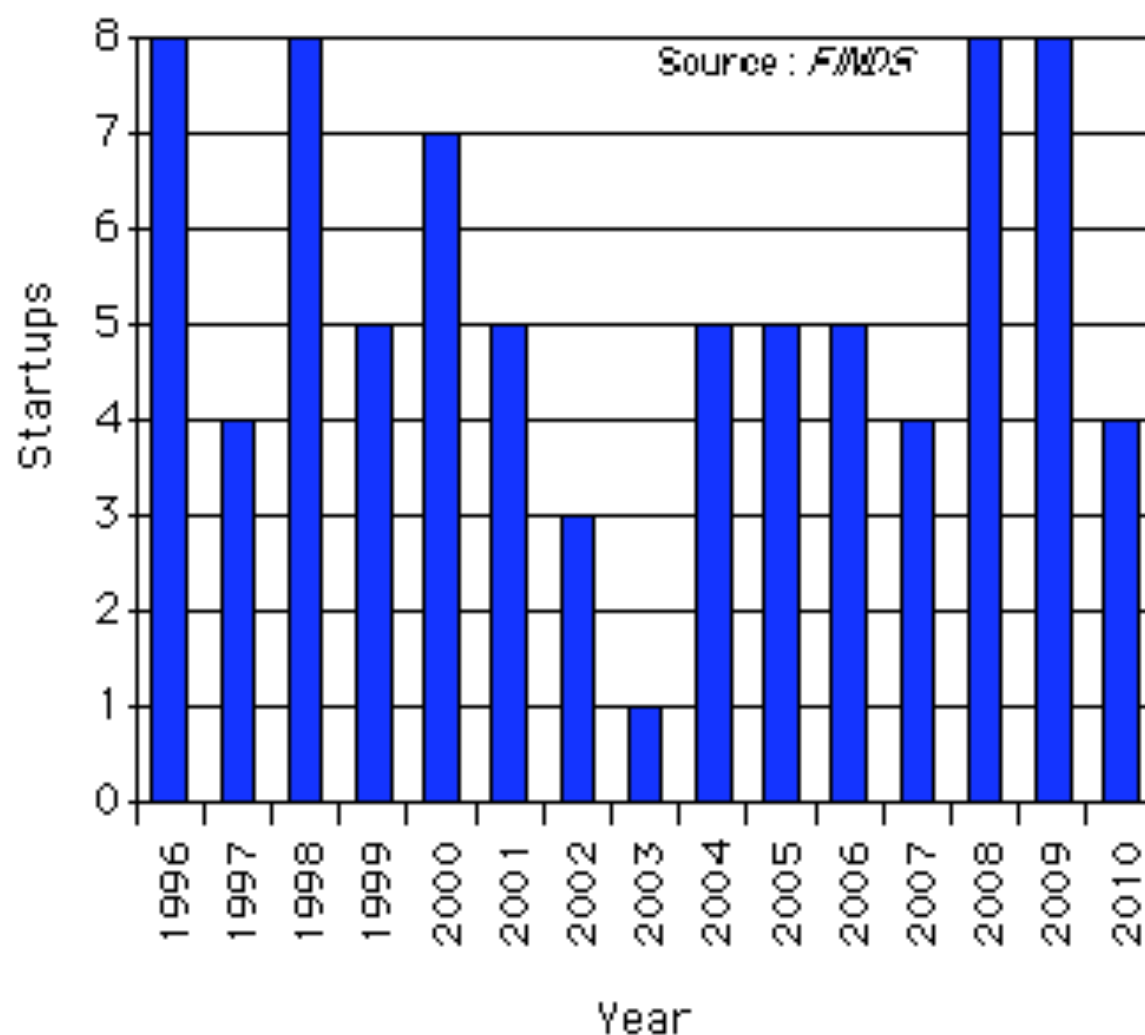


# Global Growth Rate

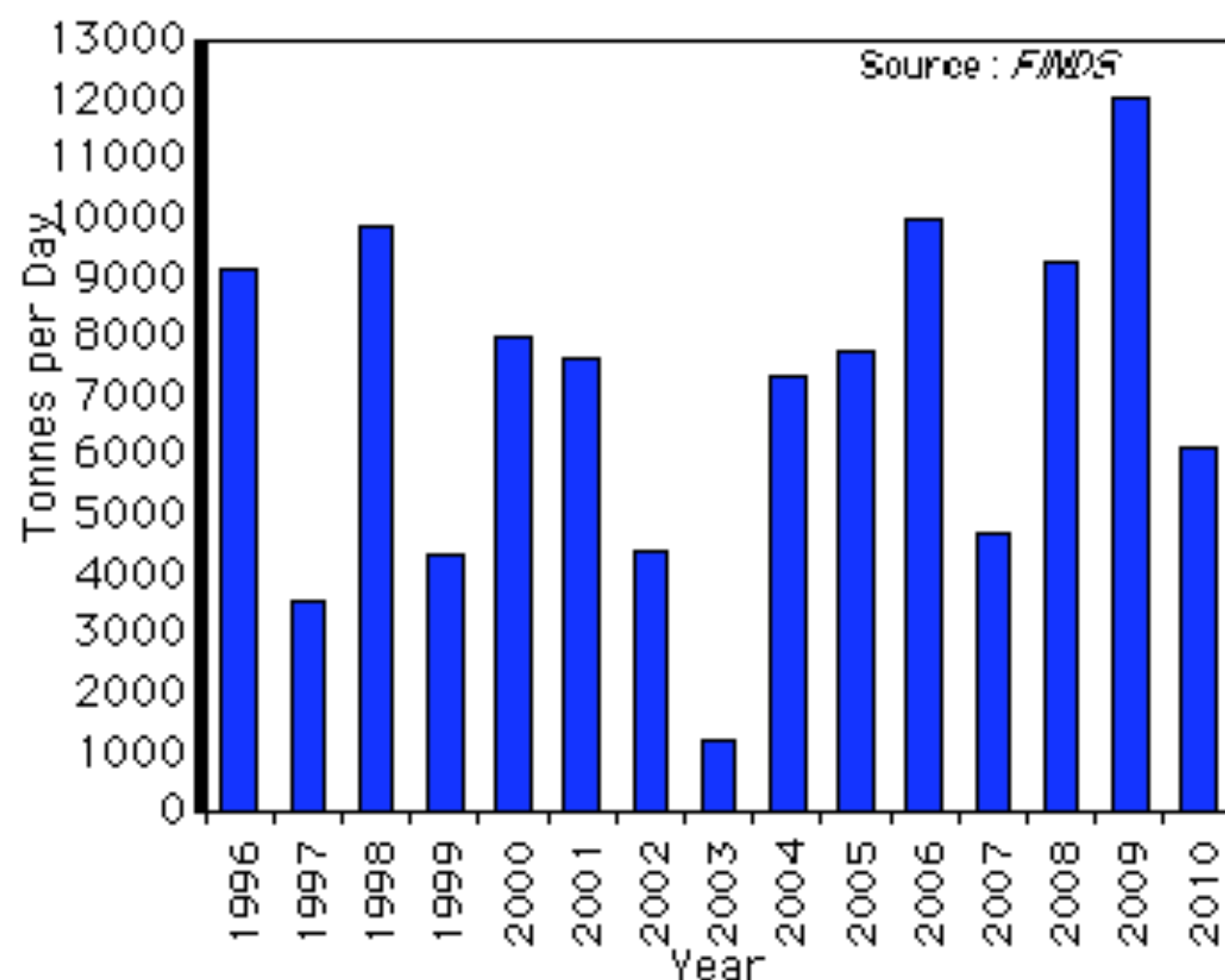




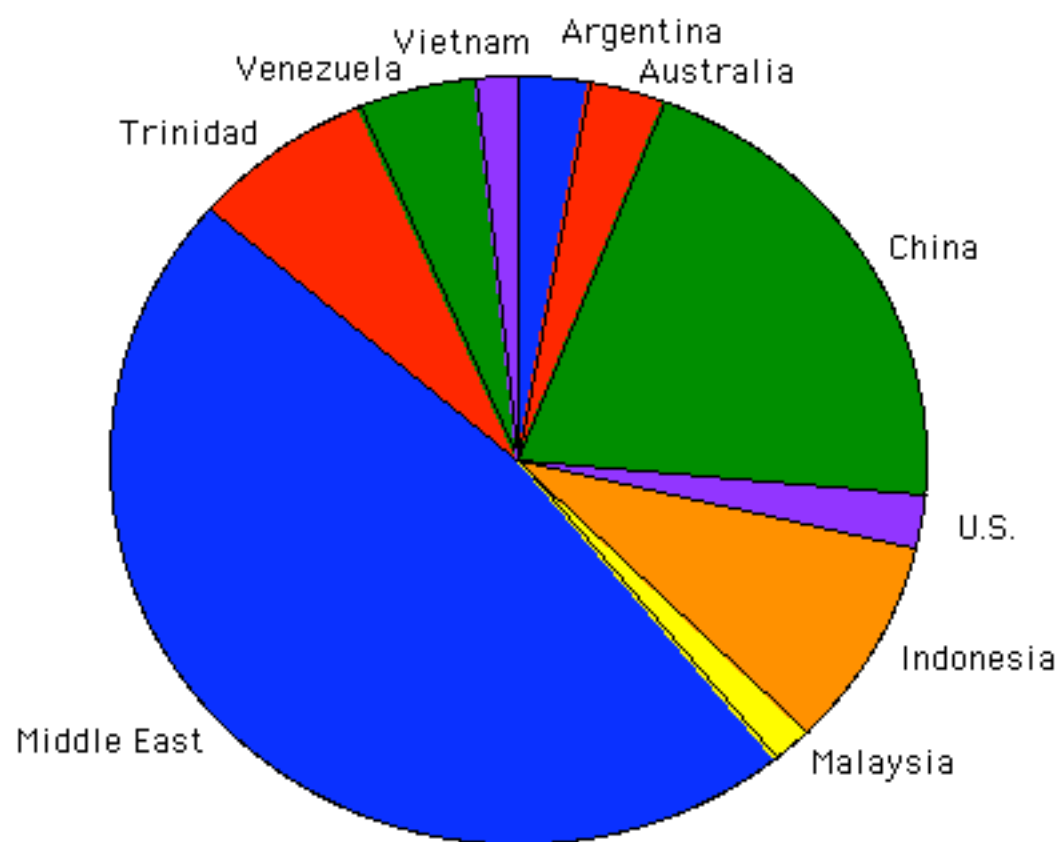
# Number of New-Plant Startups (Global) (Excludes relocations)



## Incremental New-Plant Capacity (Excludes Relocations)



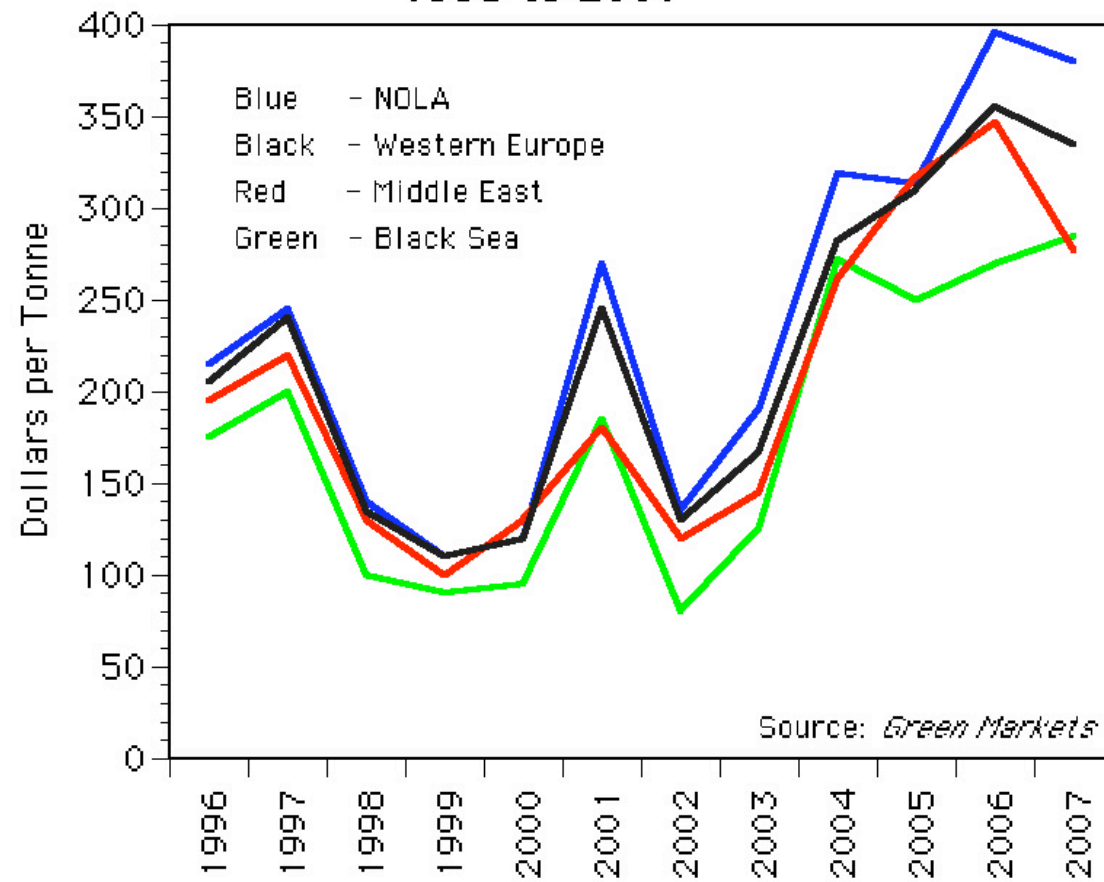
**New Startups 2000-20010,  
By Nameplate Tonnage.** Relocations Excluded



Source : *FMS*



### January Ammonia Prices 1996 to 2007



## Plant Capacities

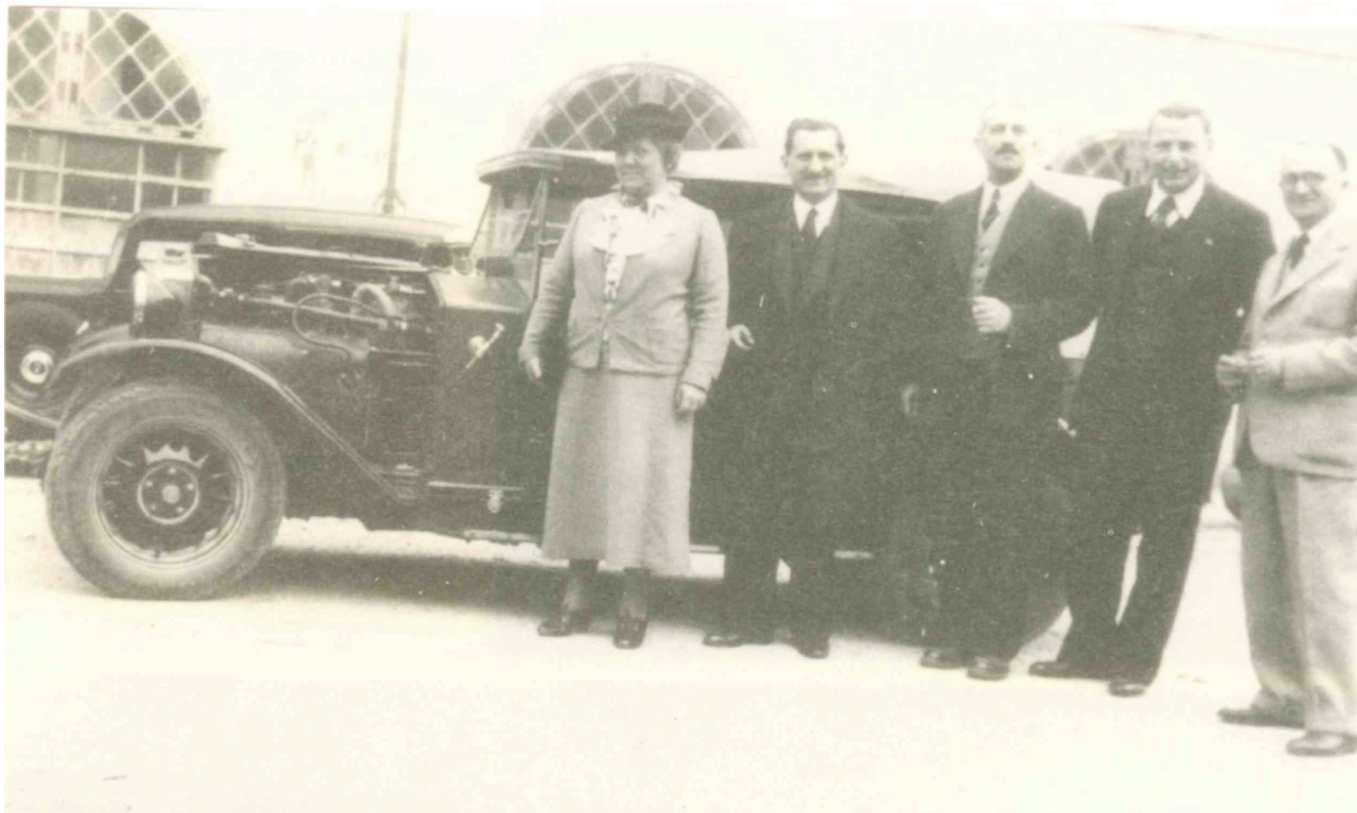
<b>Year of Startup</b>	<b>3,300</b>	<b>1,750- 2,200</b>	<b>1,500</b>	<b>1,350</b>	<b>1,100- 1,200</b>	<b>1,000</b>	<b>550- 900</b>	<b>Below 500</b>	<b>Totals</b>
<b>1996</b>			1	2		4	1		8
<b>1997</b>						2	2		4
<b>1998</b>		2		2	1		2	1	8
<b>1999</b>				1	1		3		5
<b>2000</b>		1	1	1	1	1	1	1	7
<b>2001</b>		3				2			5
<b>2002</b>		1	1			1			3
<b>2003</b>					1				1
<b>2004</b>		2	1	1			1		5
<b>2005</b>		3			1	1			5
<b>2006</b>	1	2			2				5
<b>2007</b>		1			1		2		4
<b>2008</b>		1	1		1	3	2		8
<b>2009</b>		3	1			1	1		6
<b>2010</b>		1			2				3
<b>Totals</b>	1	20	6	7	11	15	15	2	77
Excludes relocations									

# Demand-Side Issues

- Gasoline/Diesel/Ethanol/Ammonia cost per mile?
- Demand driver: savings or emissions-mandate?
- Standard engines limited to M15, E10, A\_?
- China 1.5 mm tonnes methanol as M10 in 2006
- Stationary and/or Transportation Applications?
- Hydrogen refueling station
- The plug-in gasoline/electric hybrid
- Timing



# Fiat 509, Italy, 1935



# Ammonia Engine Patented 1935

