

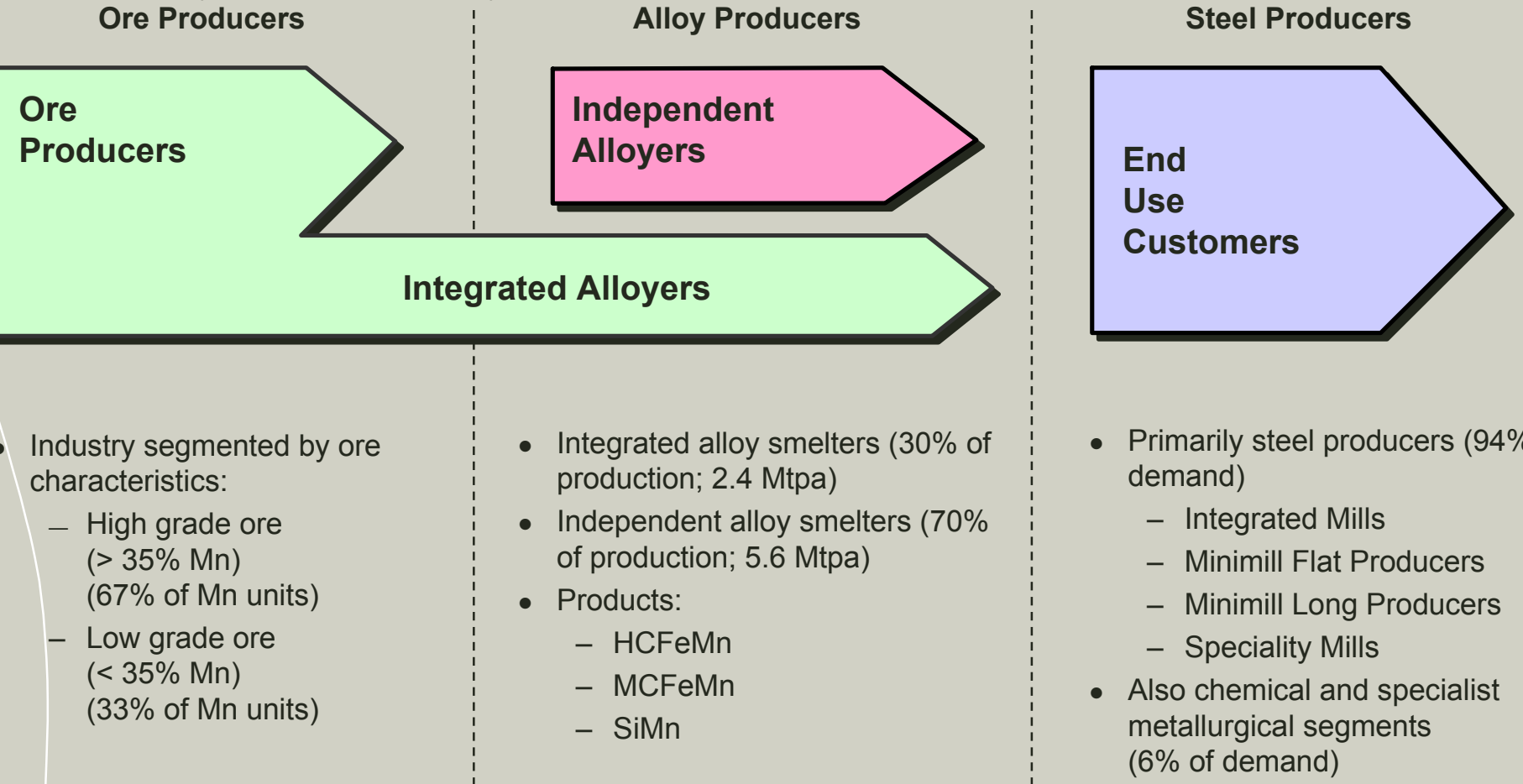
# MANGANESE ORE INDUSTRY GLOBAL OVERVIEW



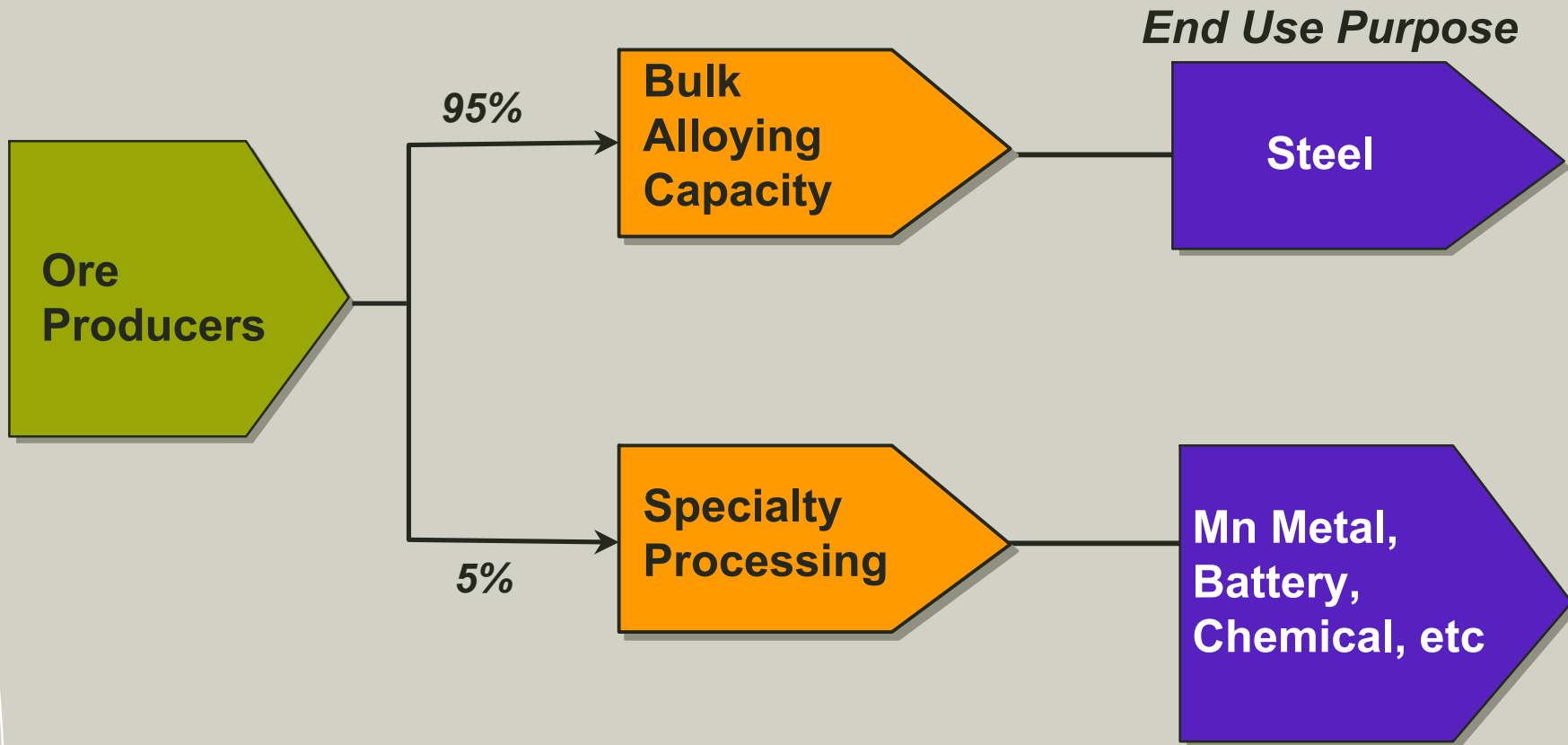
**bhpbilliton**

# Manganese value system

The manganese industry consists of three value system components which collectively describe the structure and dynamics of the industry.



# Manganese end use markets



# Specialty manganese end use markets

## Specialty processing (5% of total Mn use)

55%

### Battery

Natural battery grade (NMD) (50%)  
Electrolytic manganese dioxide (EMD) (50%)

40%

### Mn Metal

4%

### Chemical

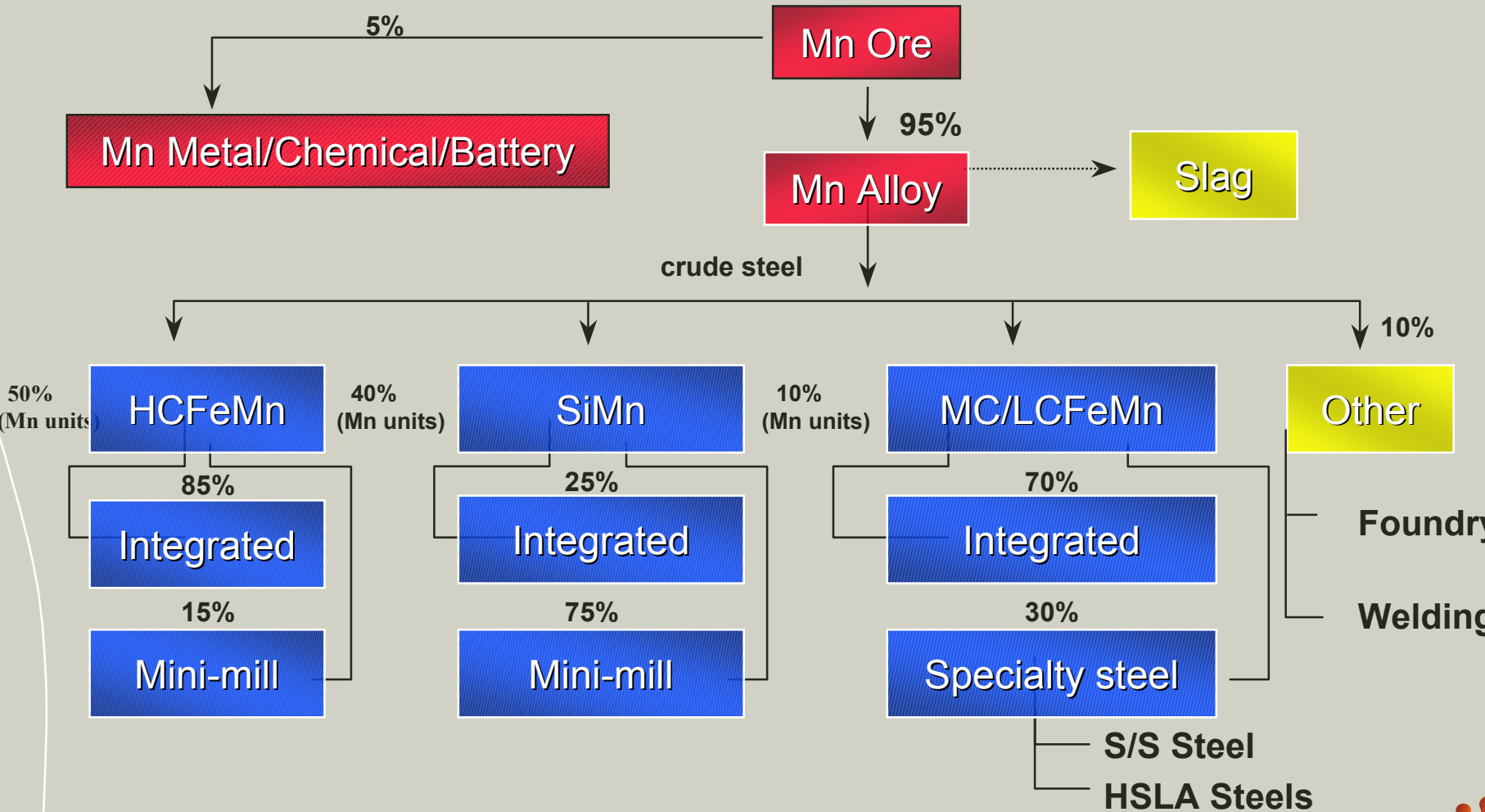
Welding fluxes  
Agriculture  
Water treatment  
Fuel additives  
Sulphur dioxide removal  
Odour control  
Catalysts  
Sealants  
Hydroquinone production

1%

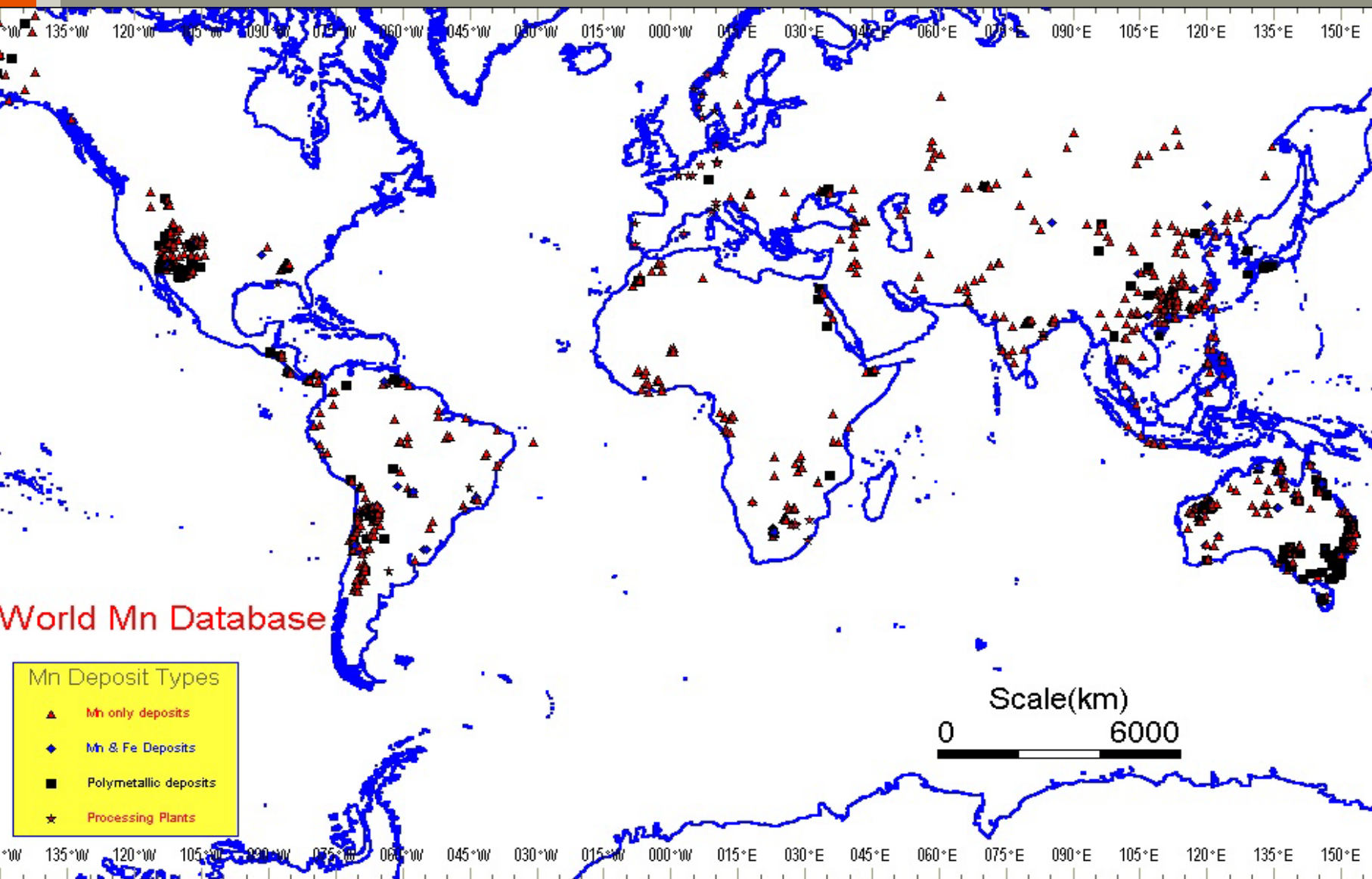
### Other

Colourants/pigments  
Ferrites  
Hydrometallurgy  
Oxidising agents  
Metal coating  
Circuit boards

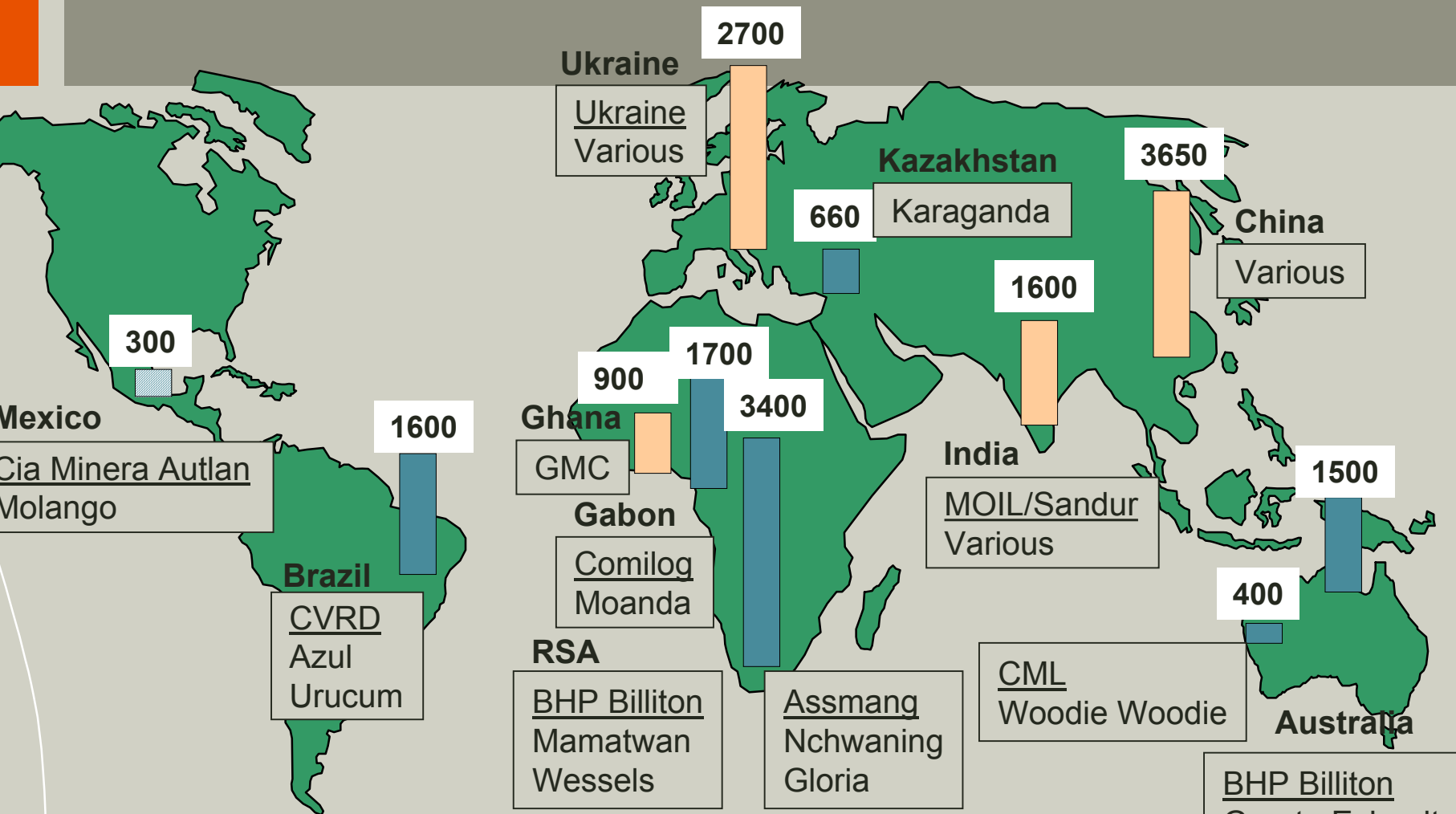
# Manganese flowchart



# World manganese deposits

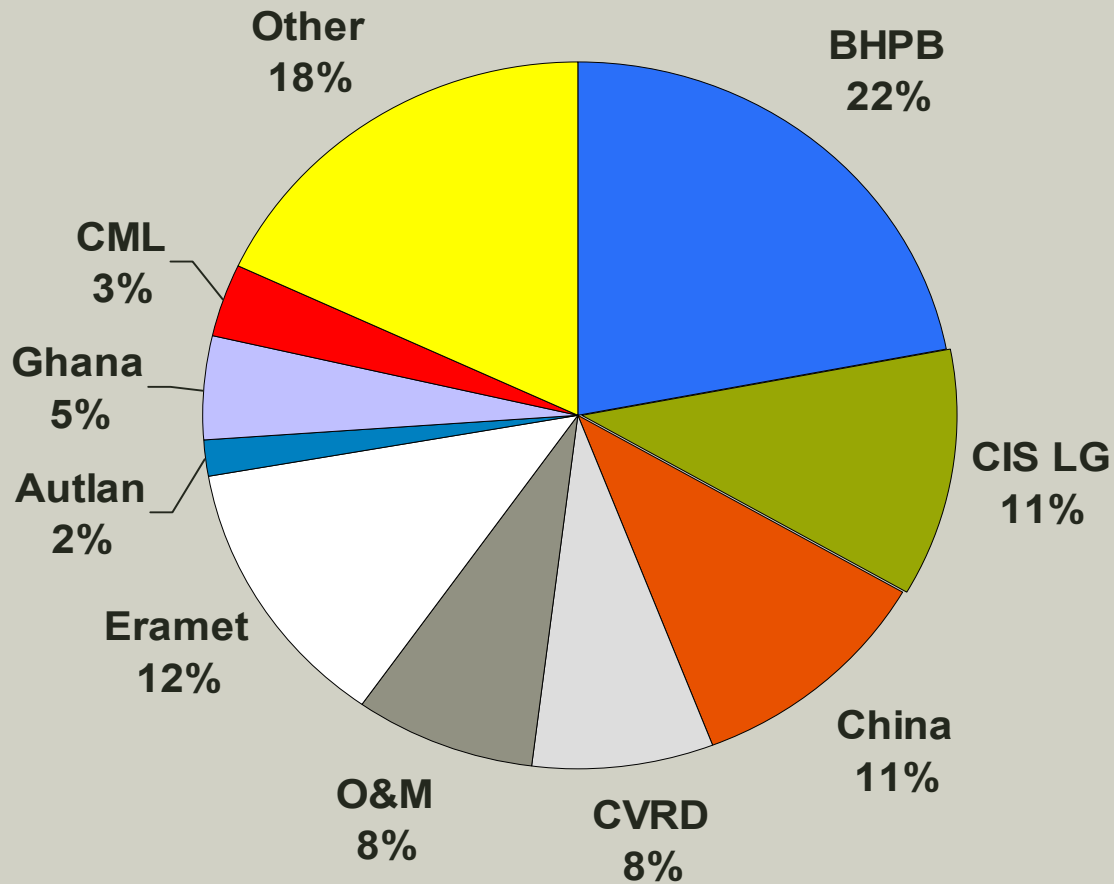


# Manganese ore production 2001 - major producers



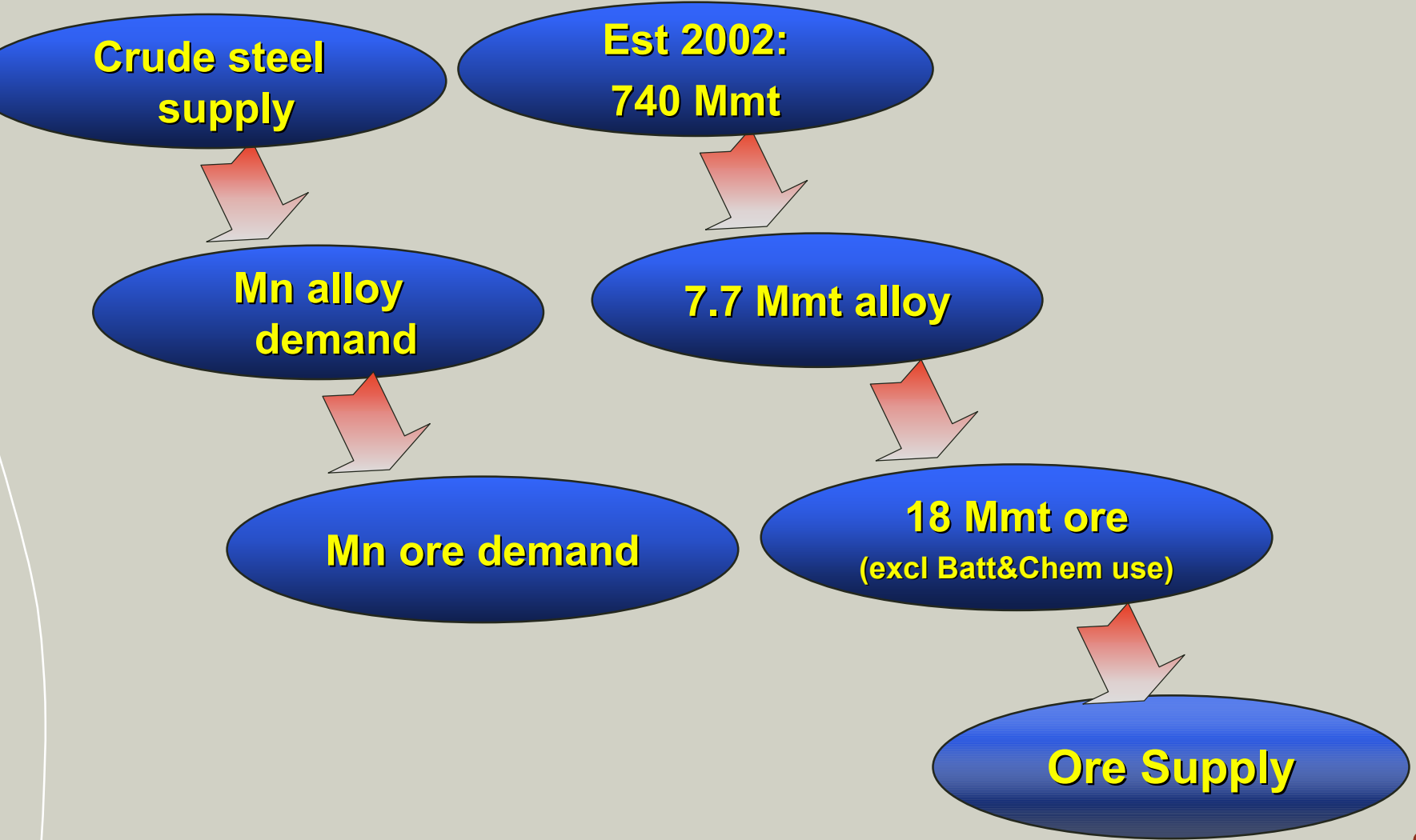
High grade (kt ore)  
 Marginal grade (kt ore)  
 Low grade (kt ore)

# Major producer market shares

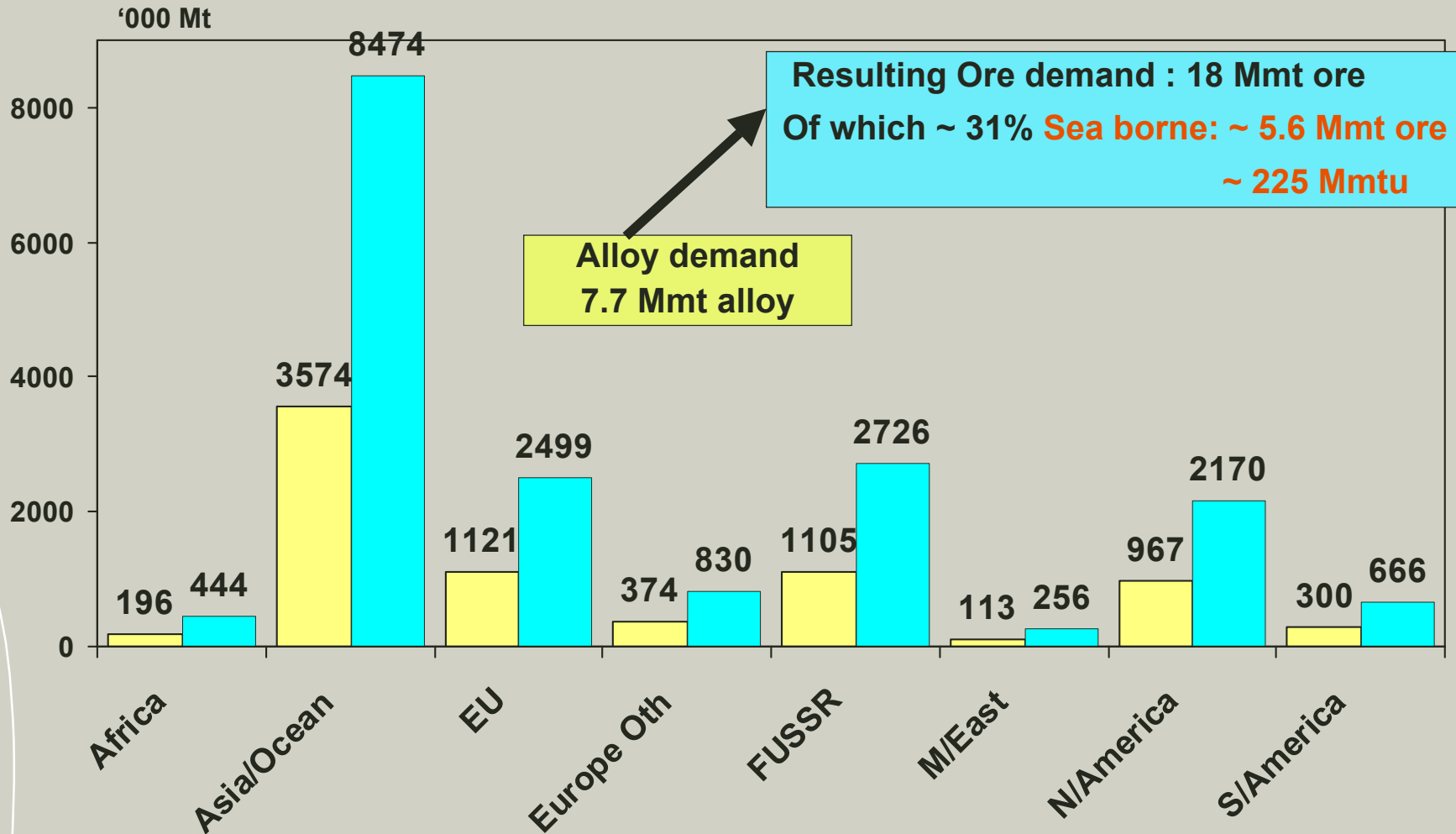




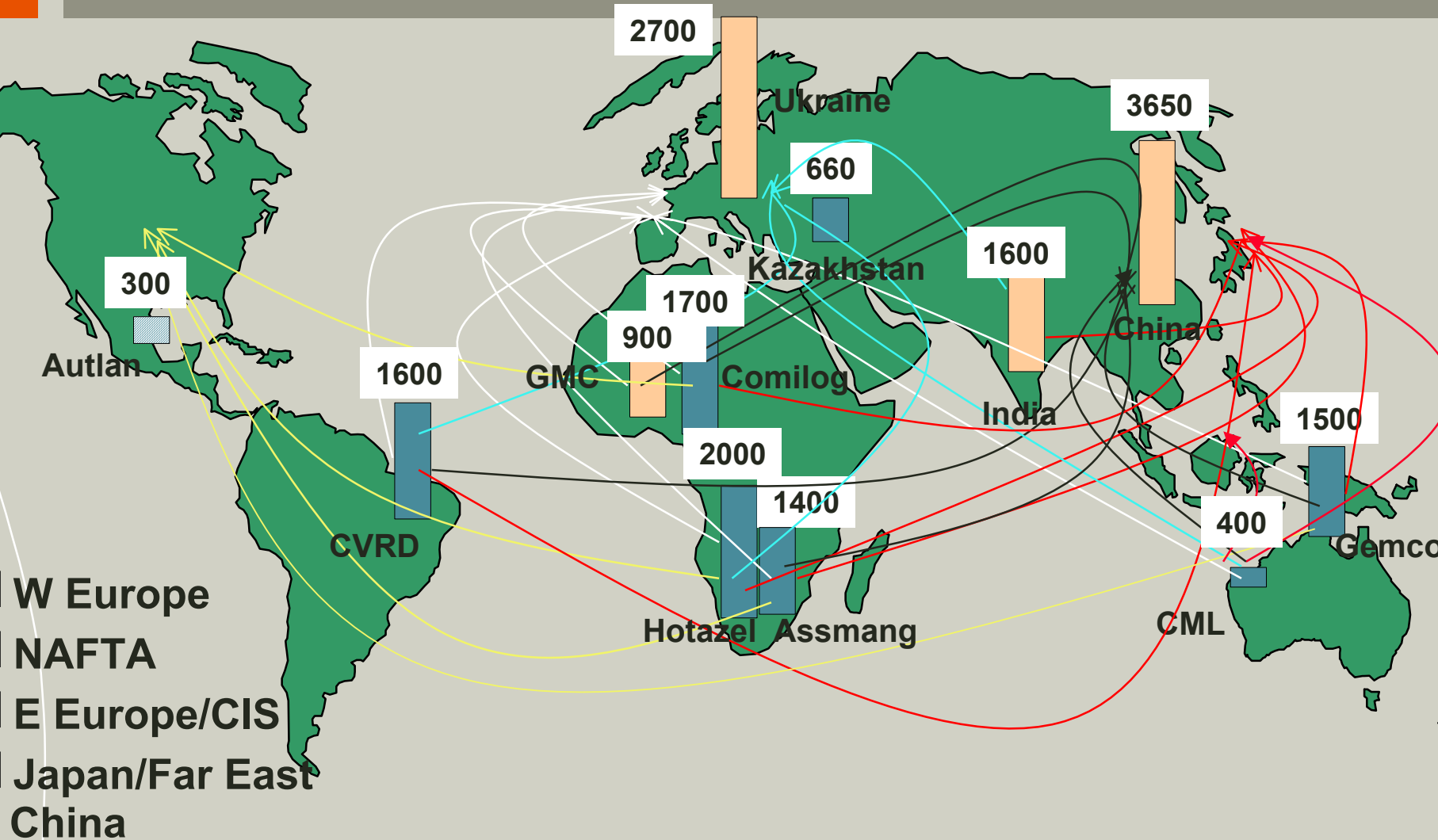
# Manganese ore demand chain



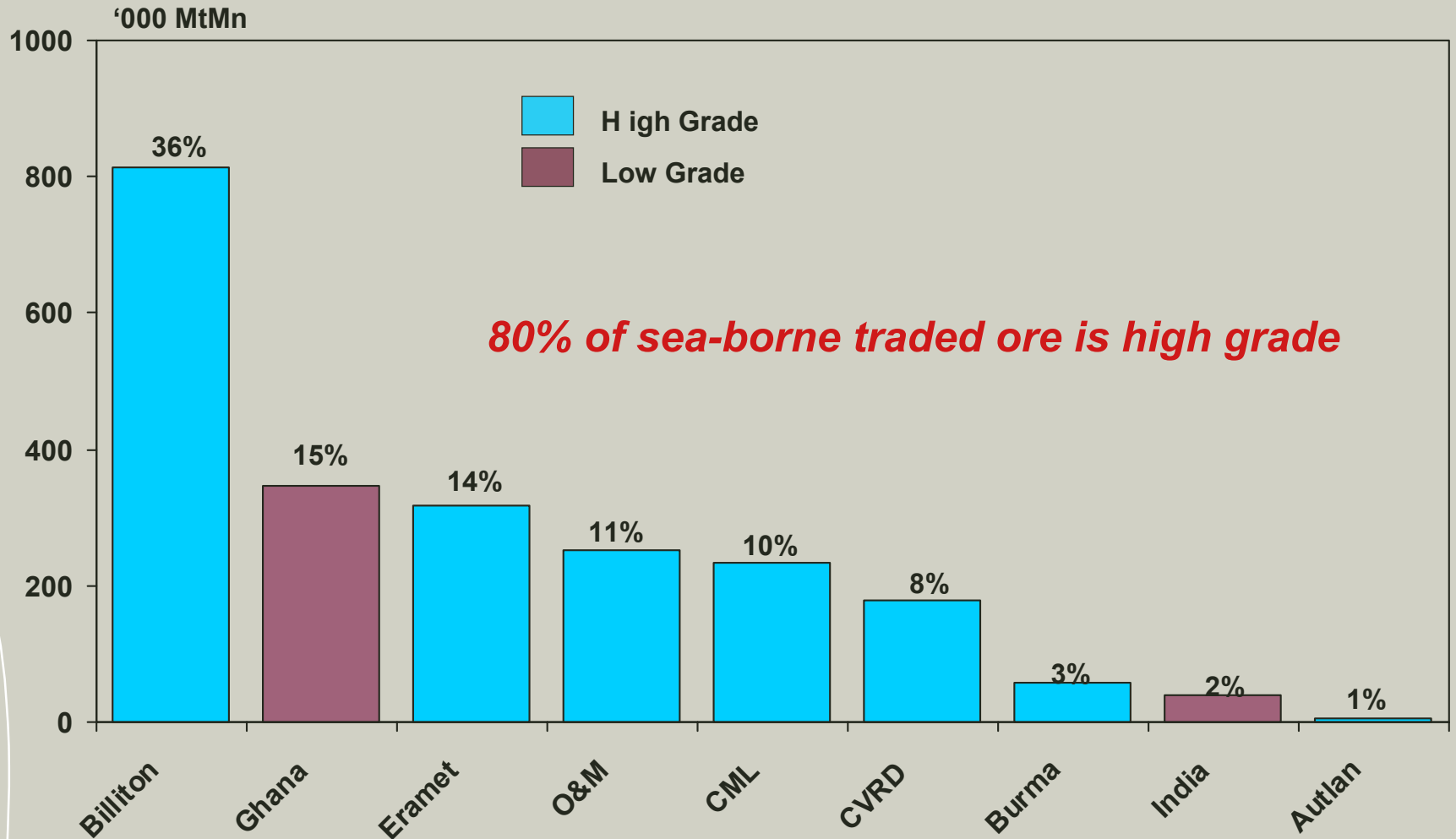
# Manganese alloy production and ore demand



# Manganese ore major trade flows ('000t ore)

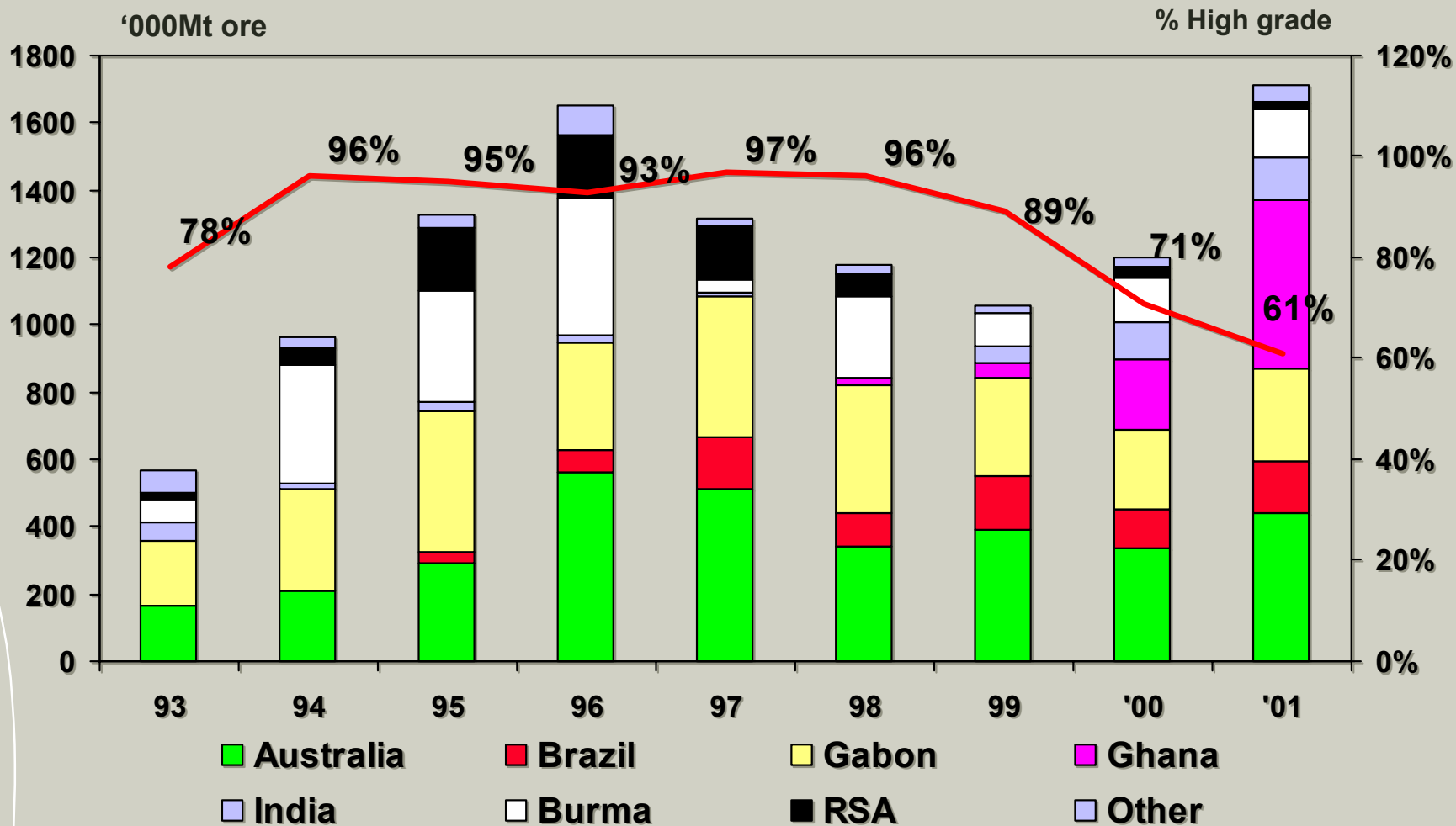


# Manganese ore - sea-borne market



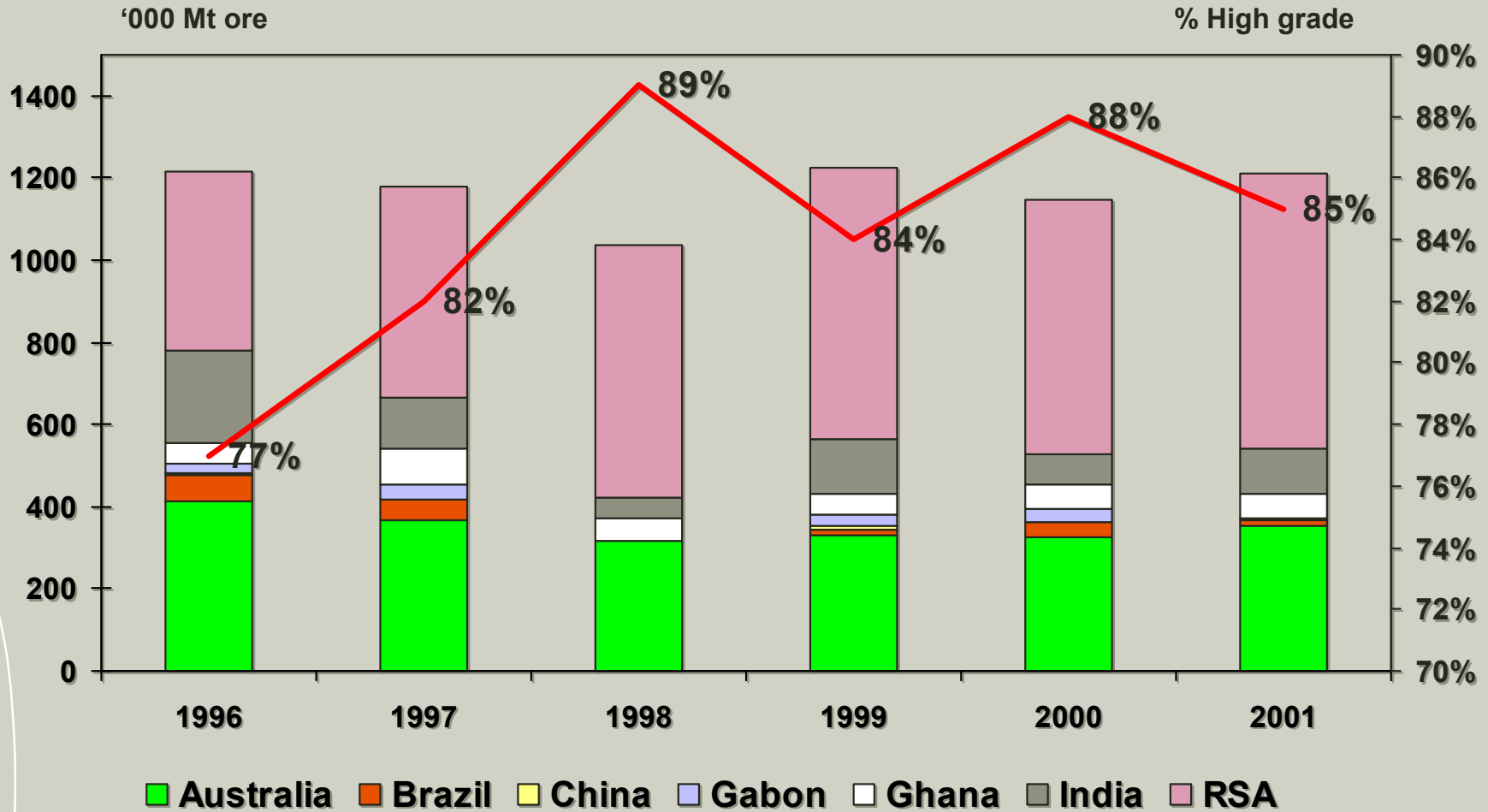
# Manganese ore trade analysis - major importers

## China



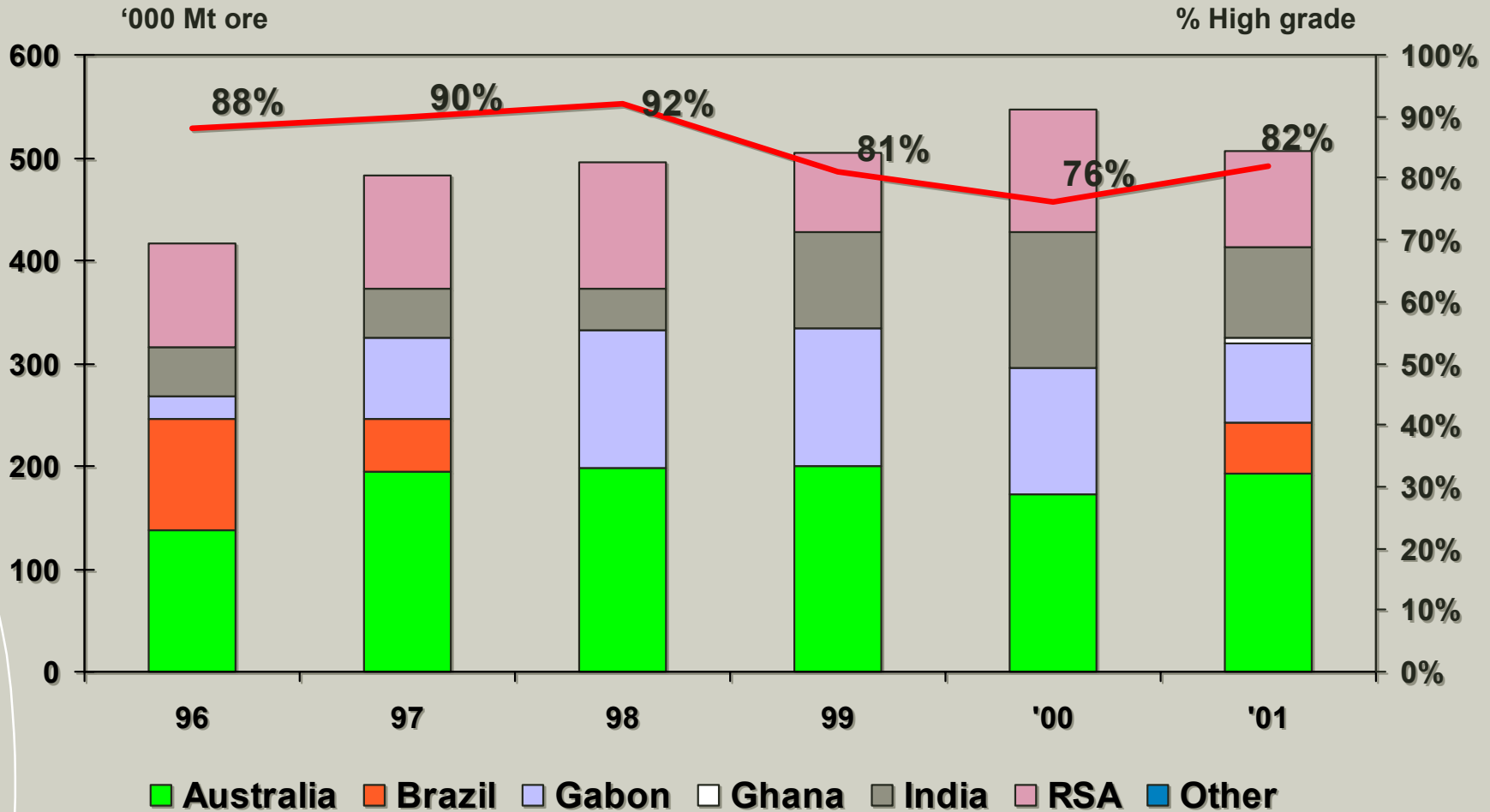
# Manganese ore trade analysis - major importers

## Japan

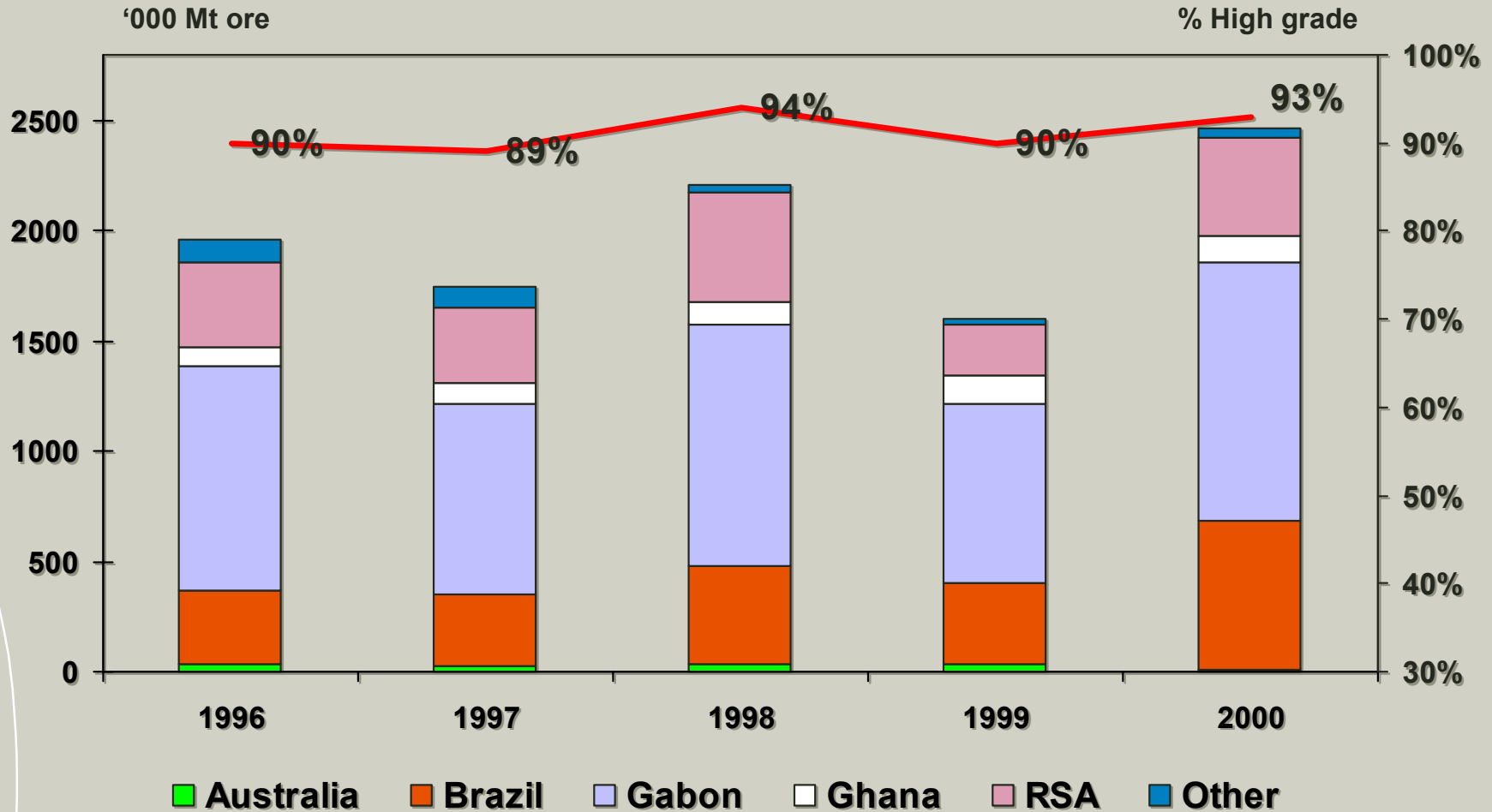


# Manganese ore trade analysis - major importers

## Korea



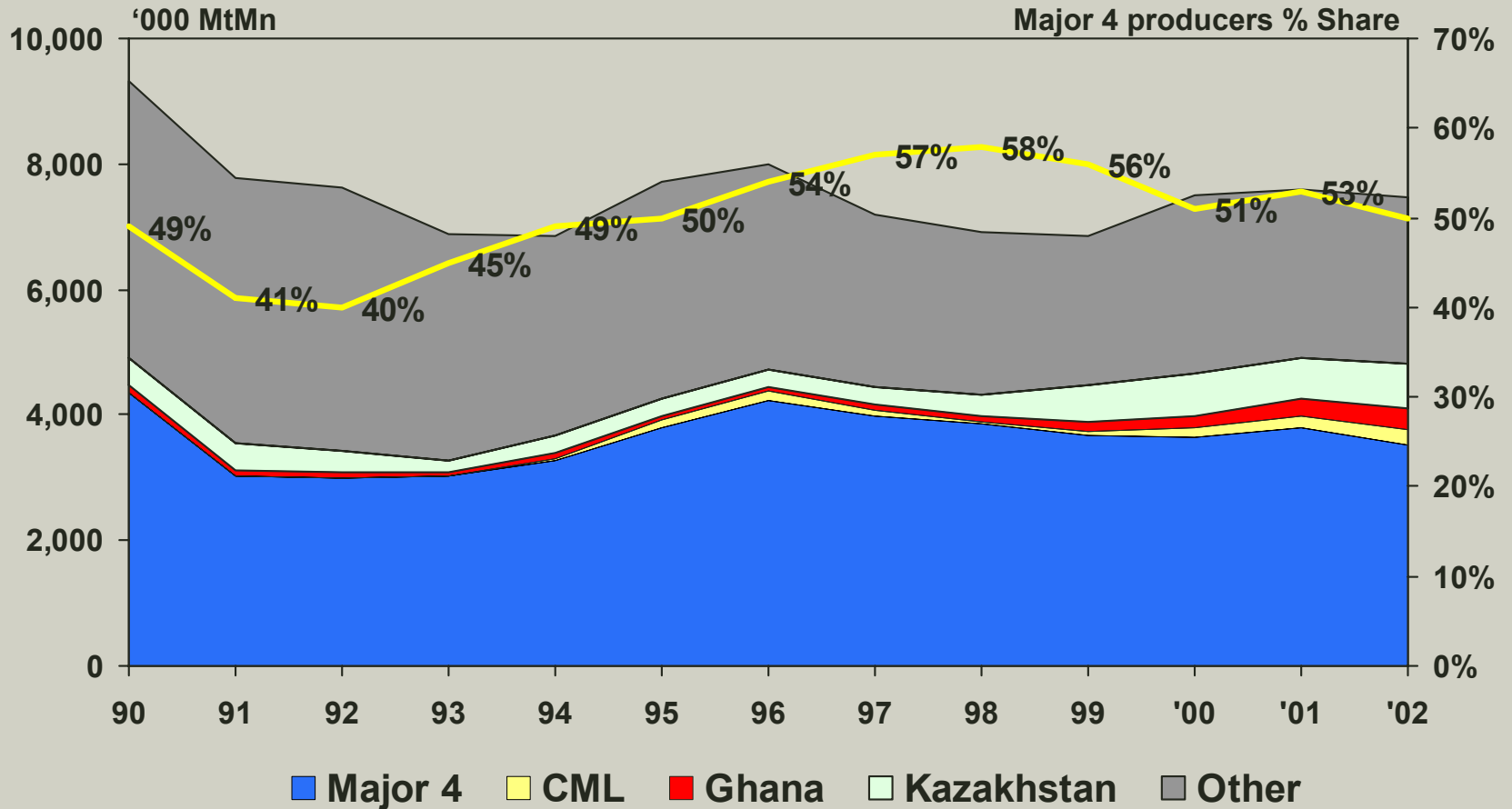
# Manganese ore trade analysis - major importers European Union





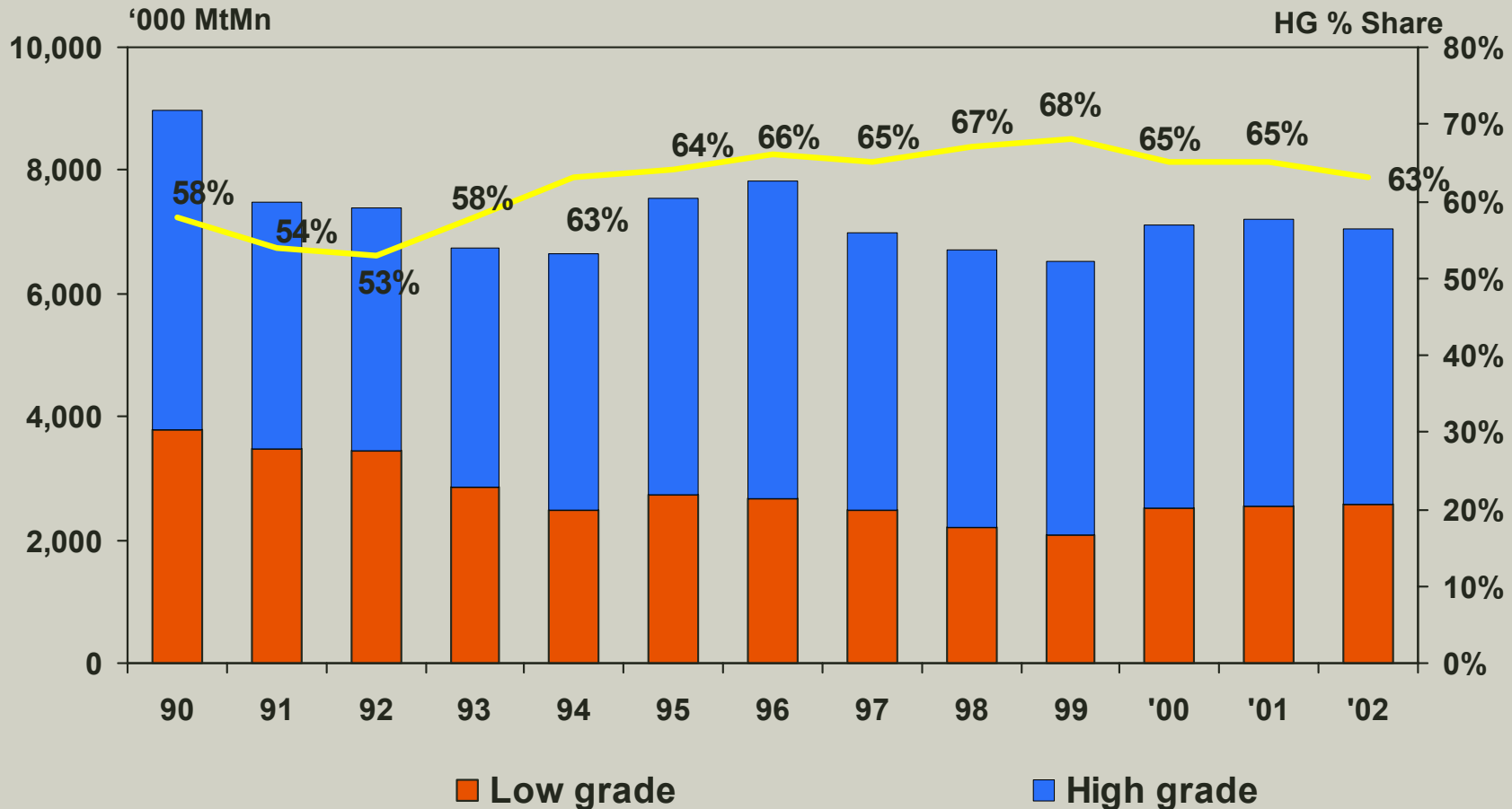
# Market share development

## Manganese ore



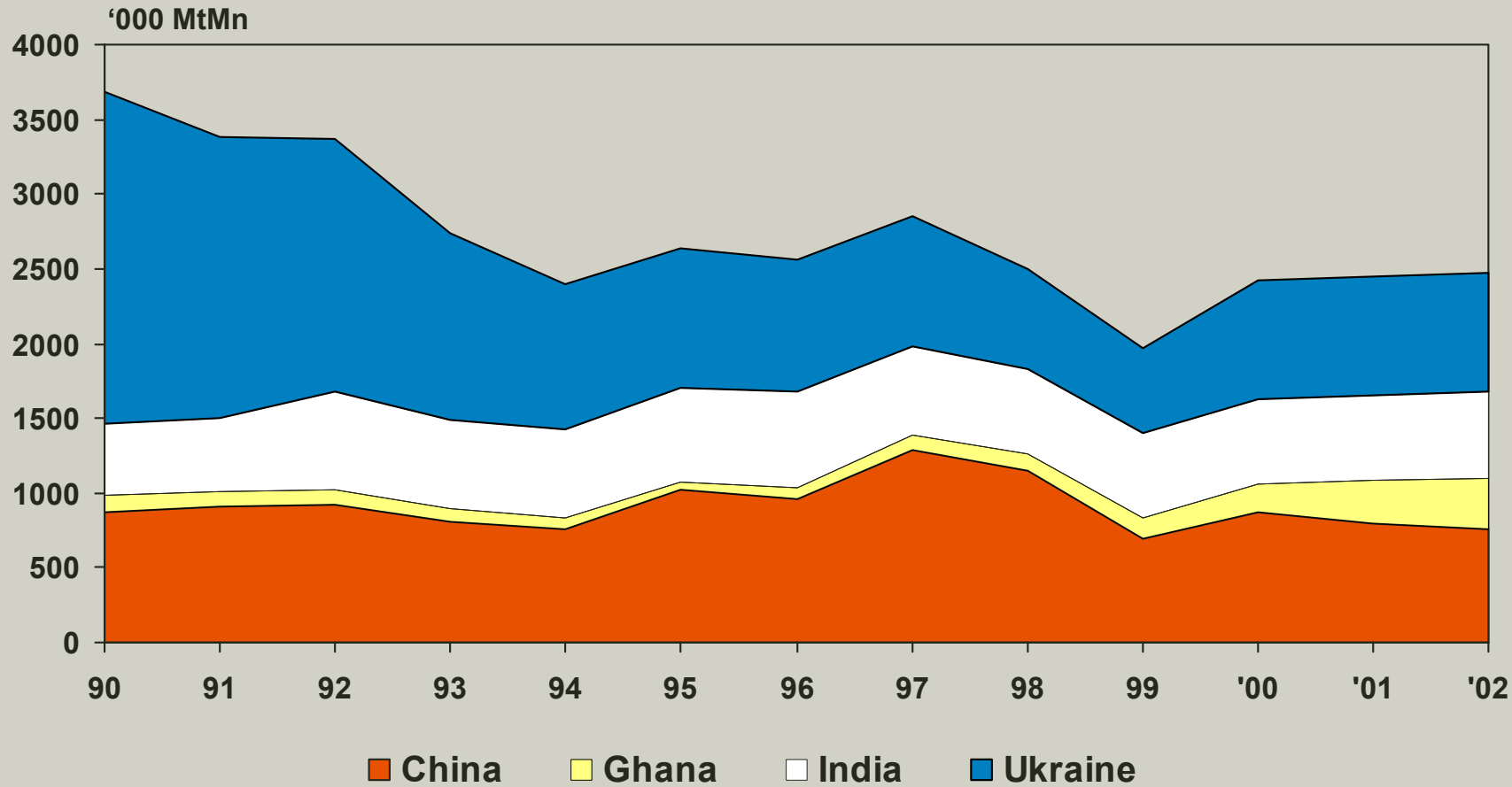
# Market share development

## High grade vs Low grade producers

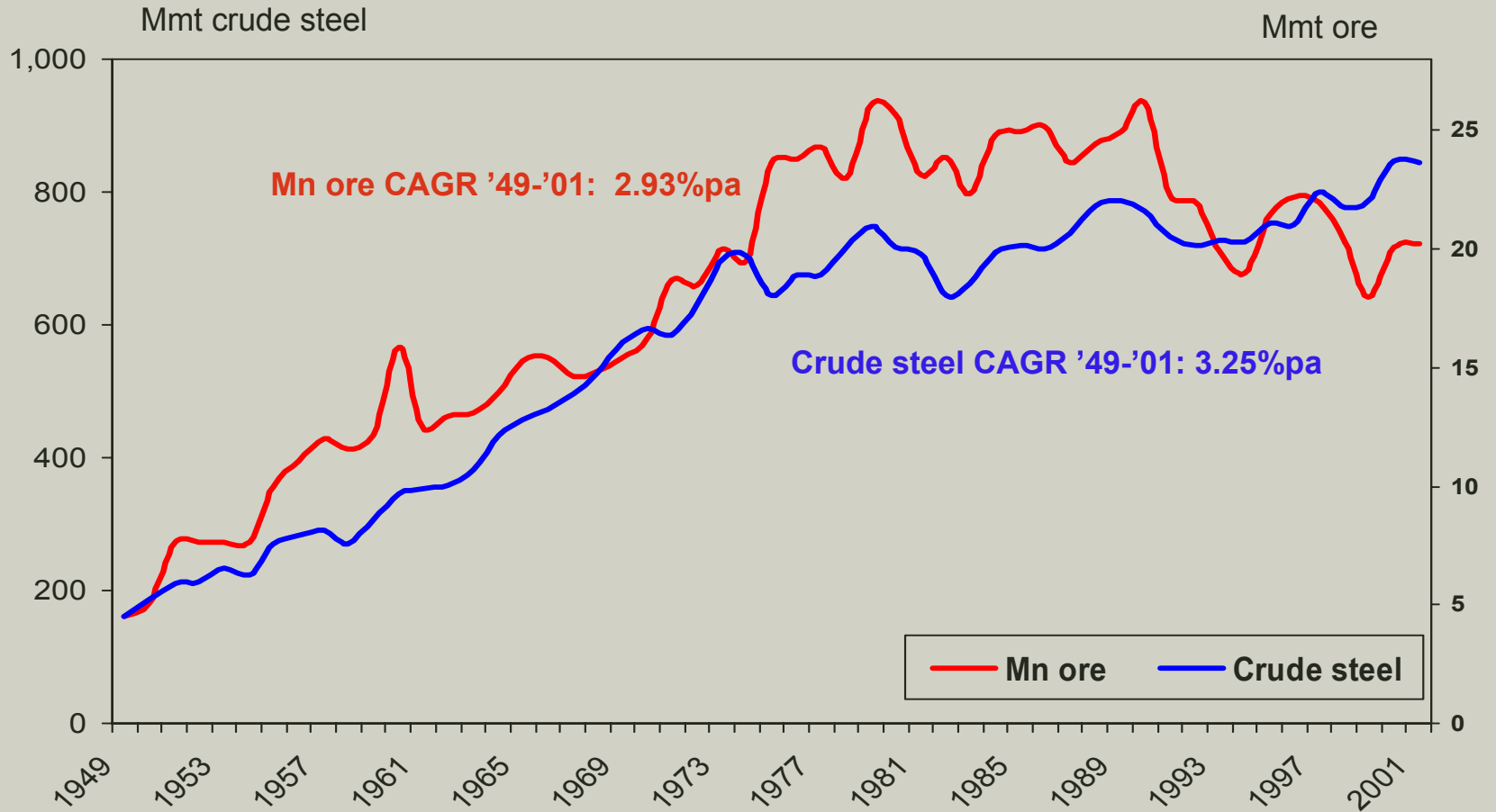


# Manganese ore

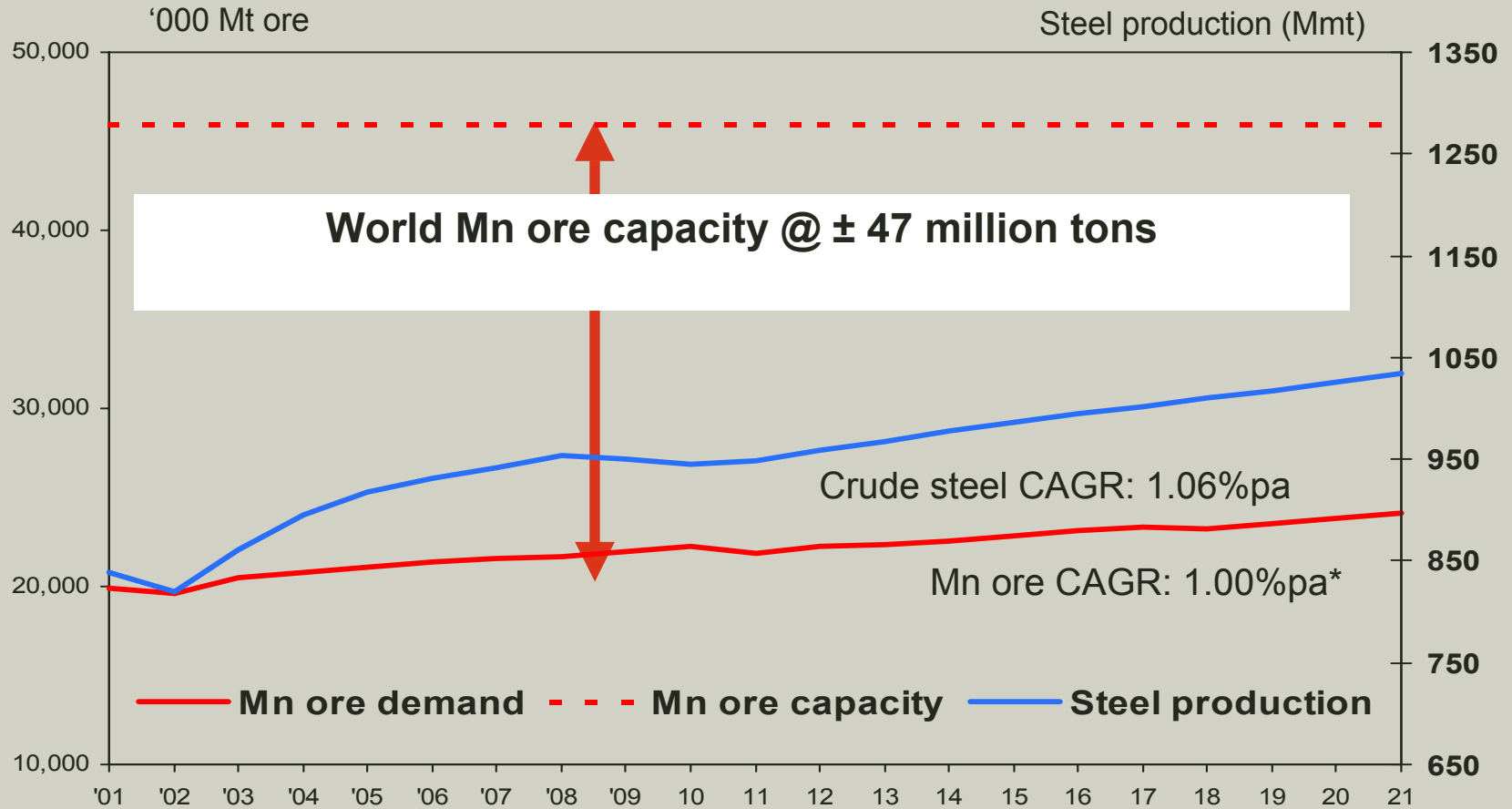
## Low grade producers



# Manganese ore demand vs Crude steel production

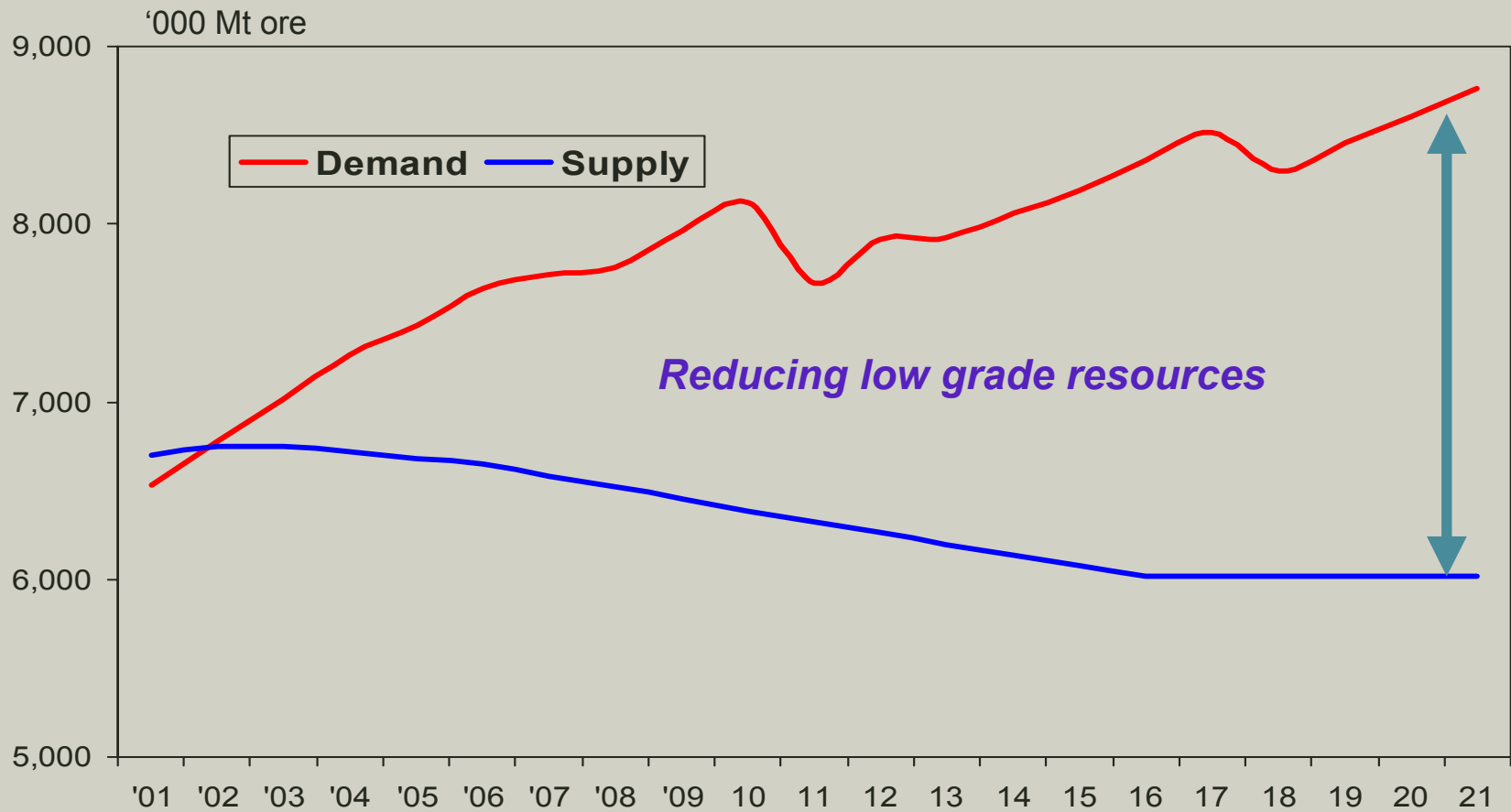


# Manganese ore capacity vs demand forecast



\*Assume 0% growth in demand for ore direct into steel, chemical, battery use

# Manganese ore supply/demand trends China, Ukraine



# Manganese ore price vs Crude steel production

