Heinz H. Pariser
Alloy Metals & Steel
Market Research

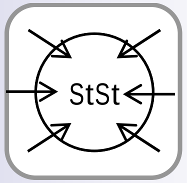
Infacon XII
Helsinki, Finland – June 09th, 2010

# Changes in the Ferro Chrome & Ferro Nickel Markets

**Heinz H. Pariser, Dr. Gerhard C. Pariser**

Heinz H. Pariser Alloy Metals & Steel Market Research
Xanten / Germany

# Outline




1. Stainless Steel Market Enviroment

Cr

2. The Chrome Industry

Ni

3. The Nickel Industry

Σ

4. Conclusion

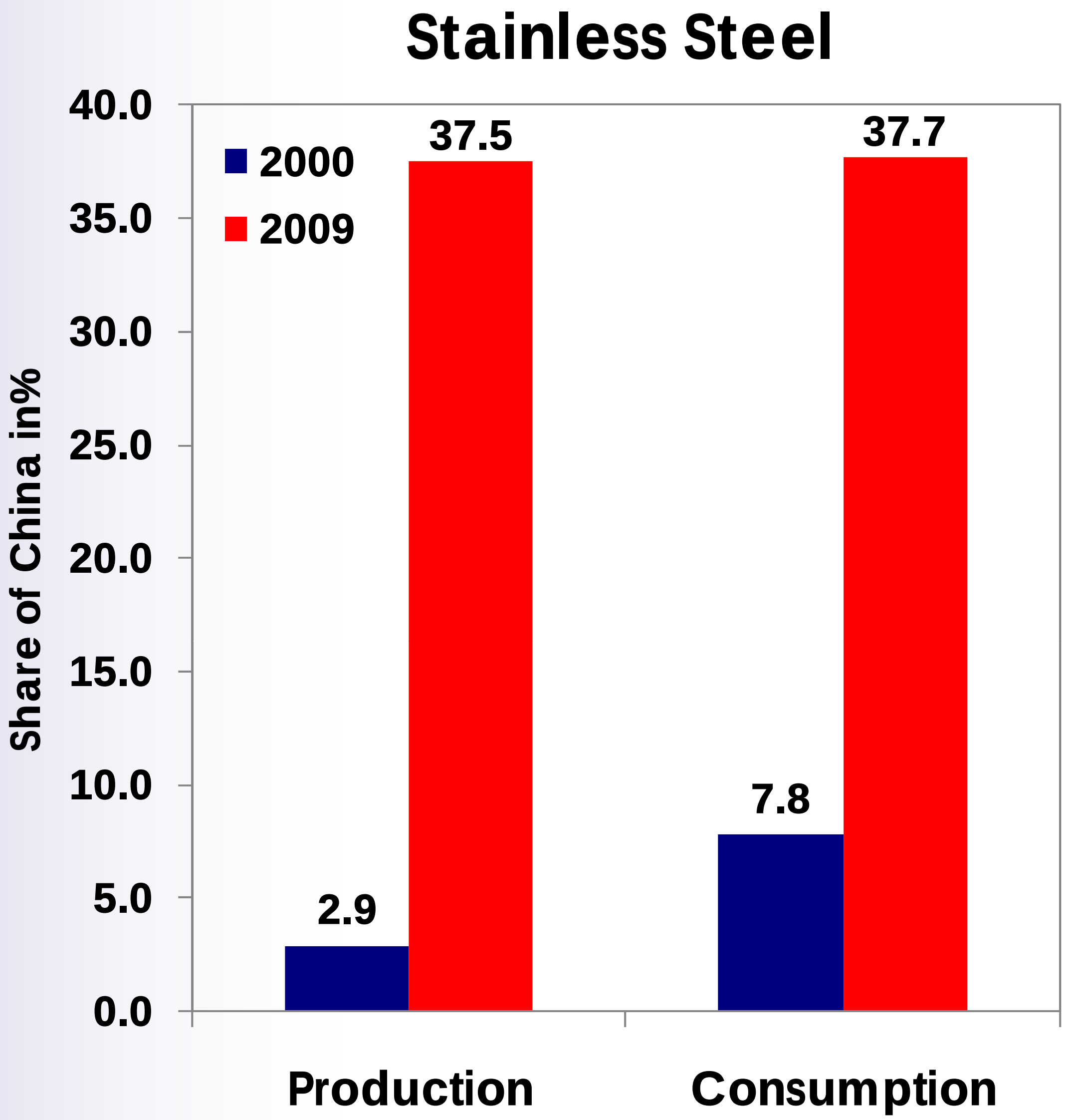
# Positioning China within the Stainless Cluster

# "Beijing's loan curbs unnerve commodities"

Whether or not Chinese demand growth experiences a significant slowdown, the country is likely to remain a powerful bullish factor for commodities!

Financial Times, Thursday May 20, 2010

# China's Position in :



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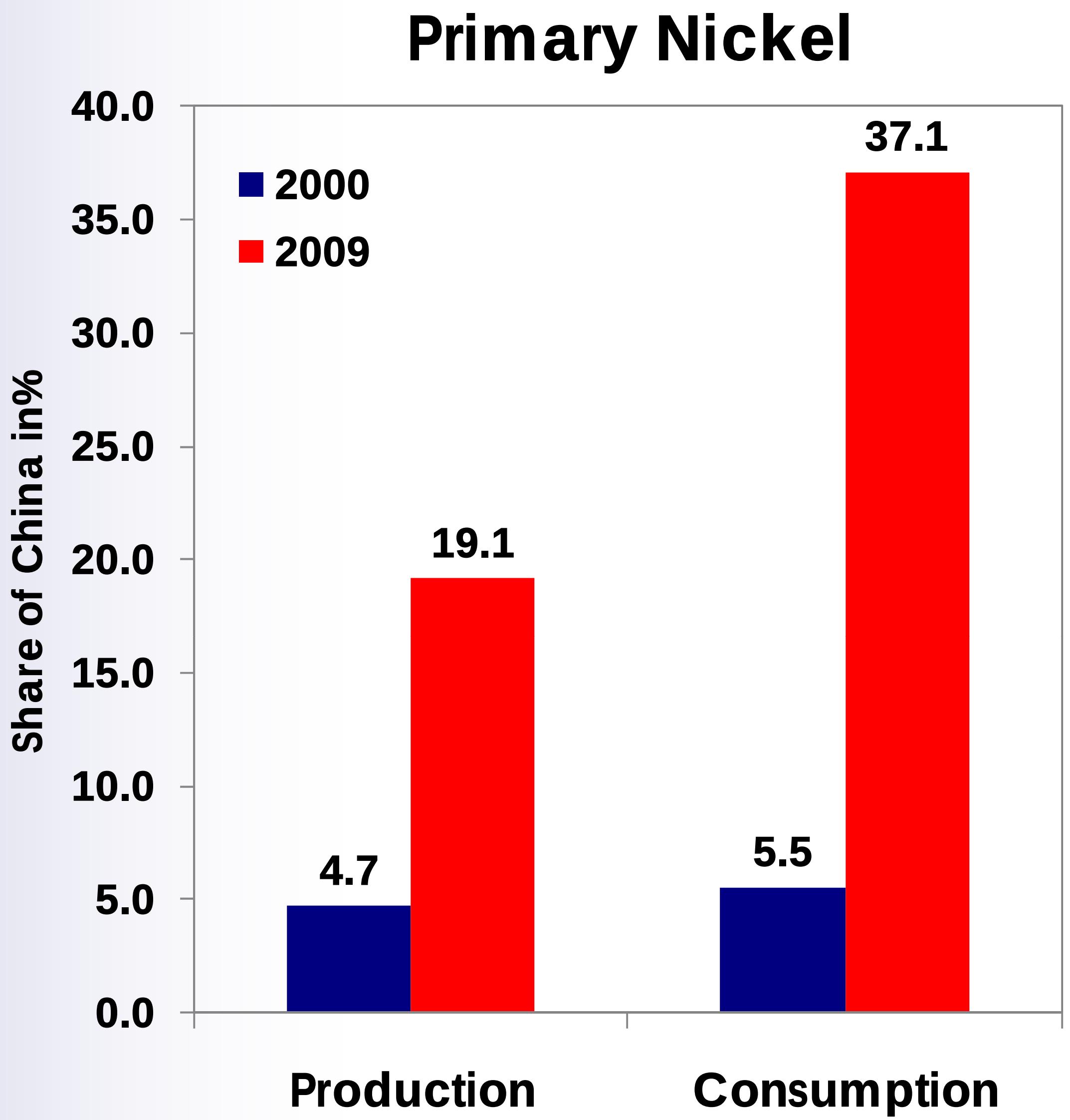

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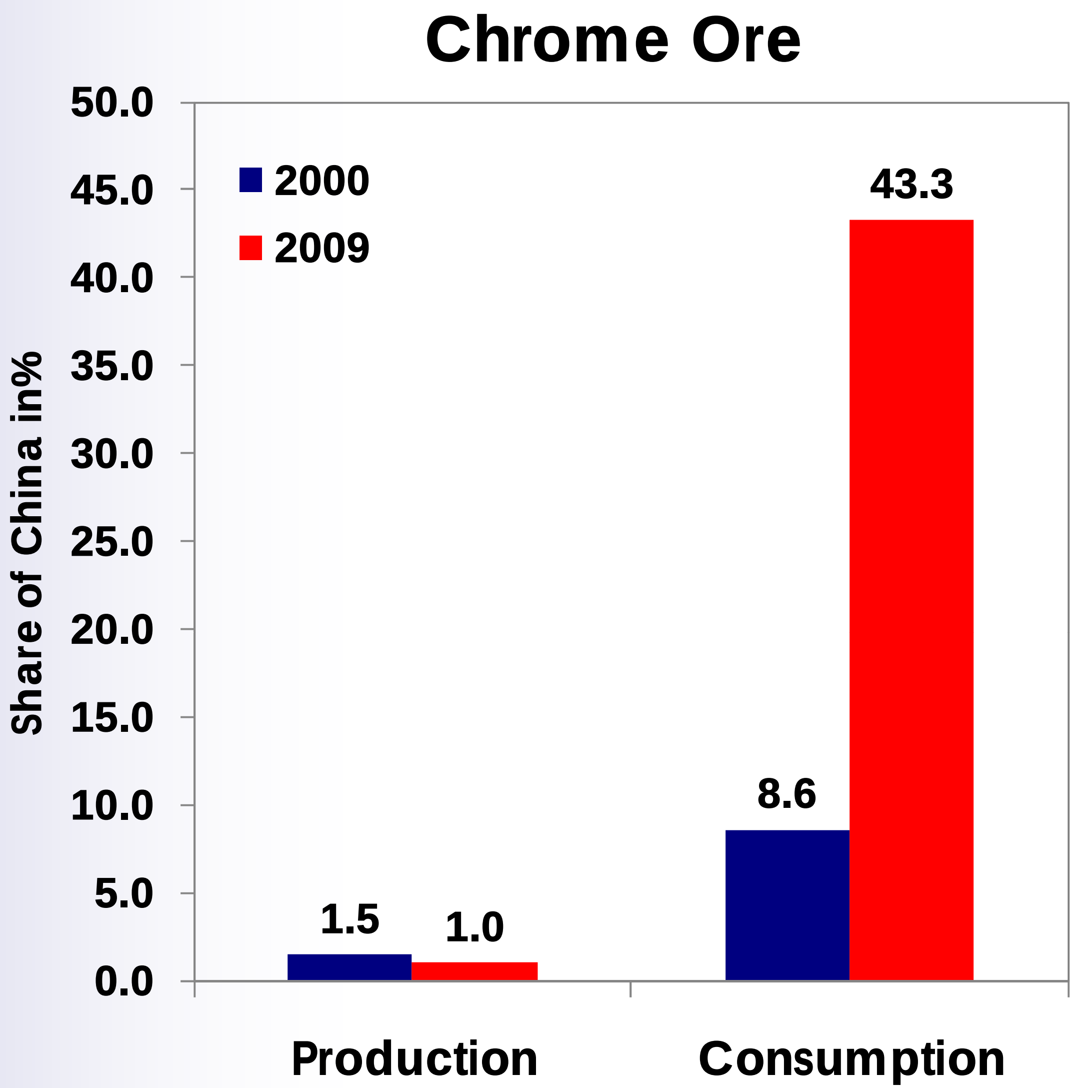

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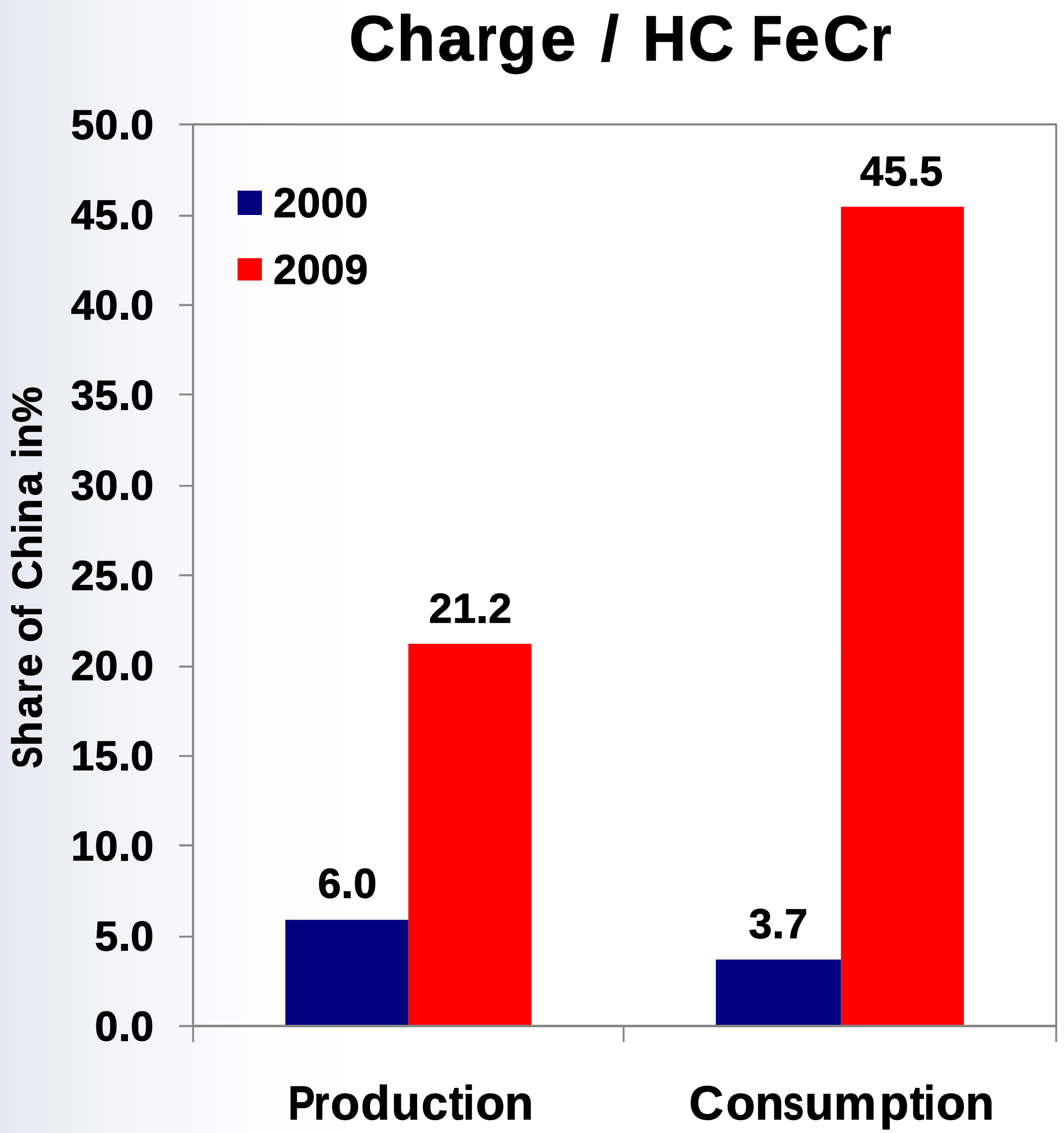

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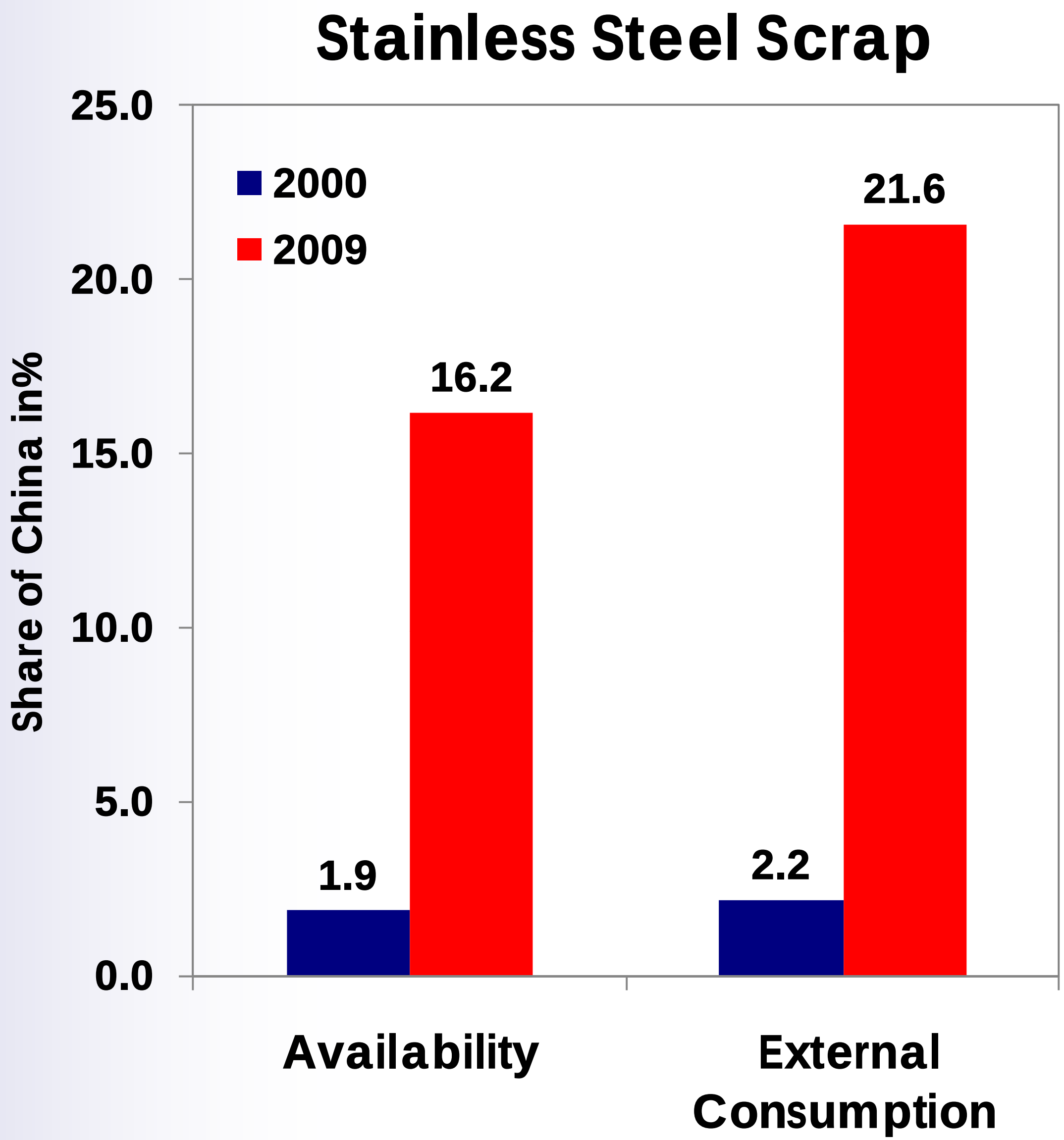

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# China´s Impact on:
# Consumption Performance Nickel & Chrome

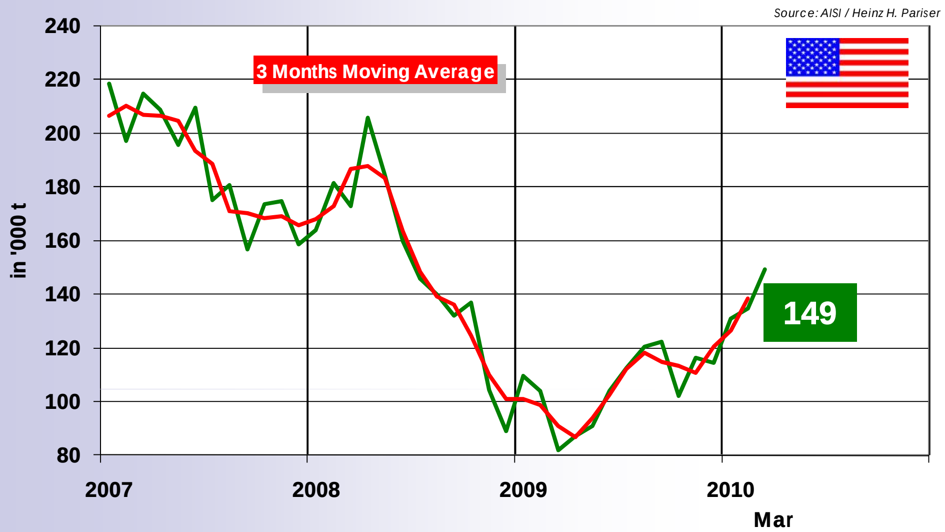
| | Nickel | | Chrome | |
|---|---|---|---|---|
| | Structure | G. R. 00-09 | Structure | G. R. 00-09 |
| | in % | | | |
| America | 9.8 | -2.3 | 4.6 | -0.4 |
| EU | 21.8 | -3.1 | 17.9 | -1.2 |
| Japan | 10.2 | -3.2 | 6.5 | -2.7 |
| Other Asia | 15.8 | -1.1 | 18.4 | 2.2 |
| Others | 5.3 | -0.1 | 7.2 | 10.1 |
| Subtotal | 62.9 | -2.4 | 54.5 | 0.5 |
| China | 37.1 | 25.0 | 45.5 | 40.9 |
| Total | 100.0 | 1.7 | 100.0 | 6.3 |

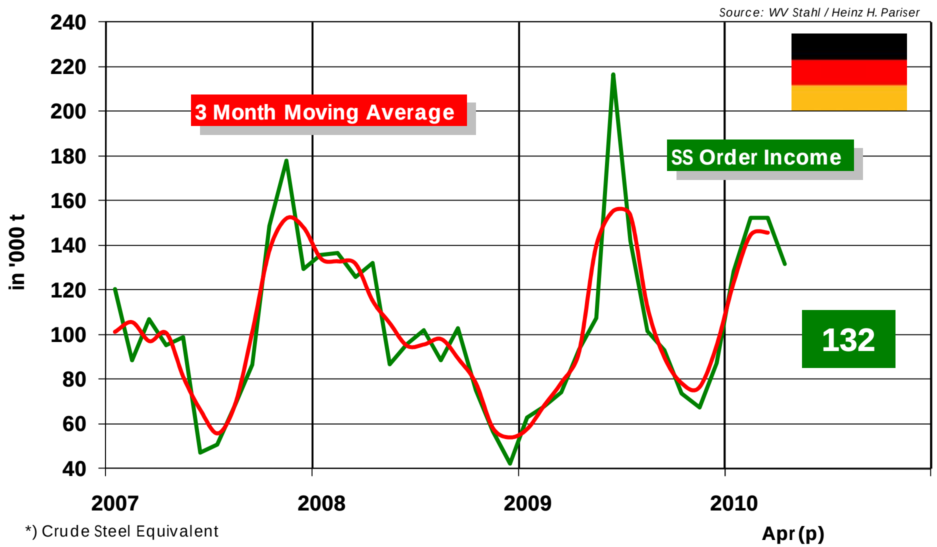
# Global Nickel & Chrome First Use Segments

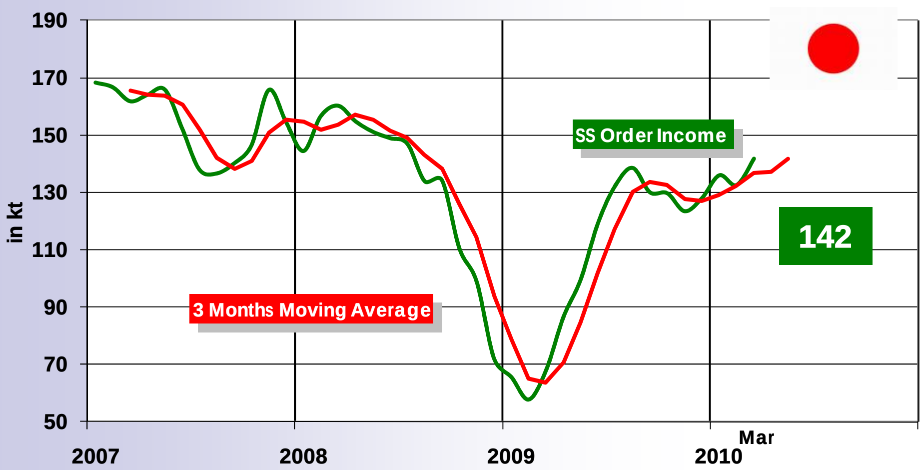
| | Nickel | | Chrome | |
|---|---|---|---|---|
| | Structure | G. R. 00-09 | Structure | G. R. 00-09 |
| | in % | | | |
| Stainless Steel | 60.1 | 1.7 | 70.5 | 4.5 |
| Alloy Steel | 6.2 | -0.6 | 25.1 | 4.0 |
| Others | 33.7 | 2.7 | 4.4 | 4.2 |
| Total | 100.0 | 1.9 | 100.0 | 4.3 |

# Stainless Steel Market Enviroment

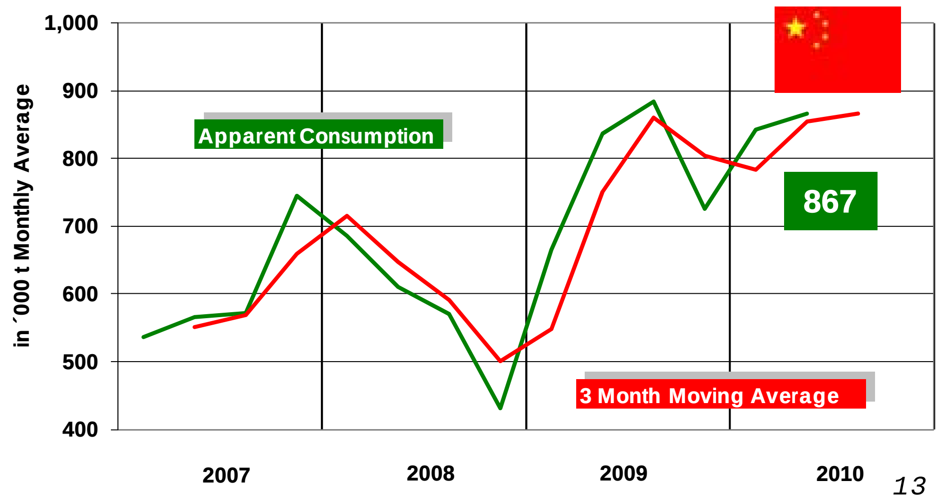
# Stainless Steel Market Status



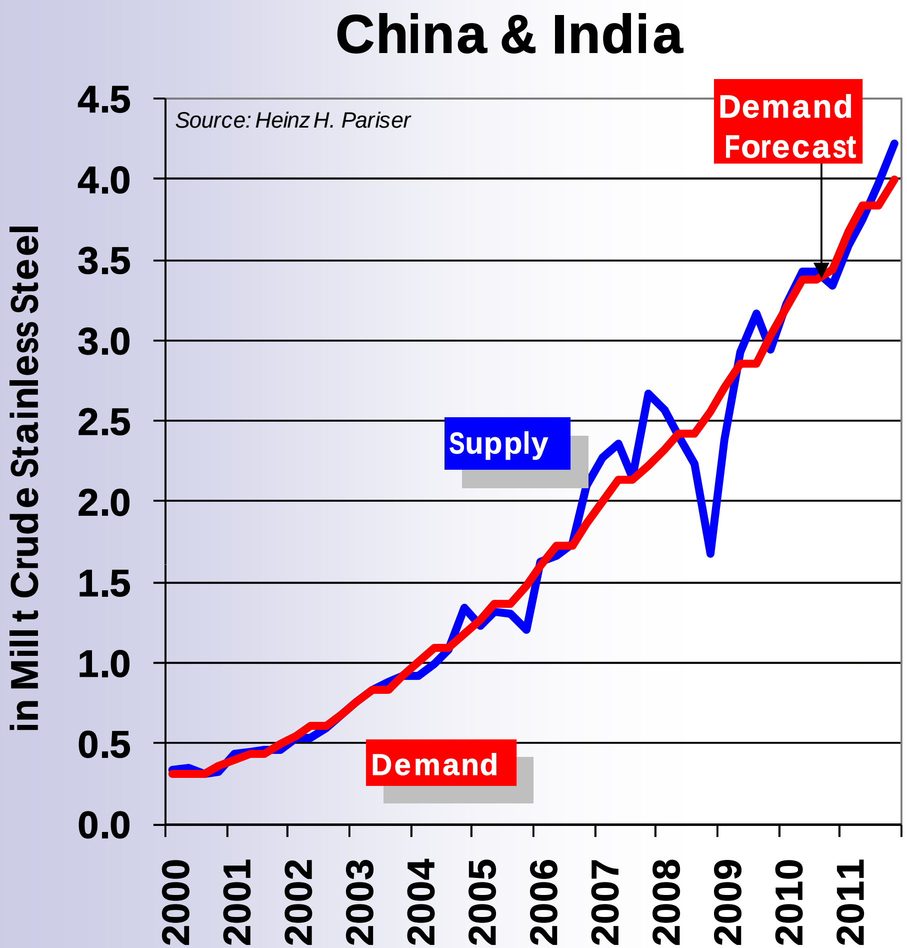

* flat products

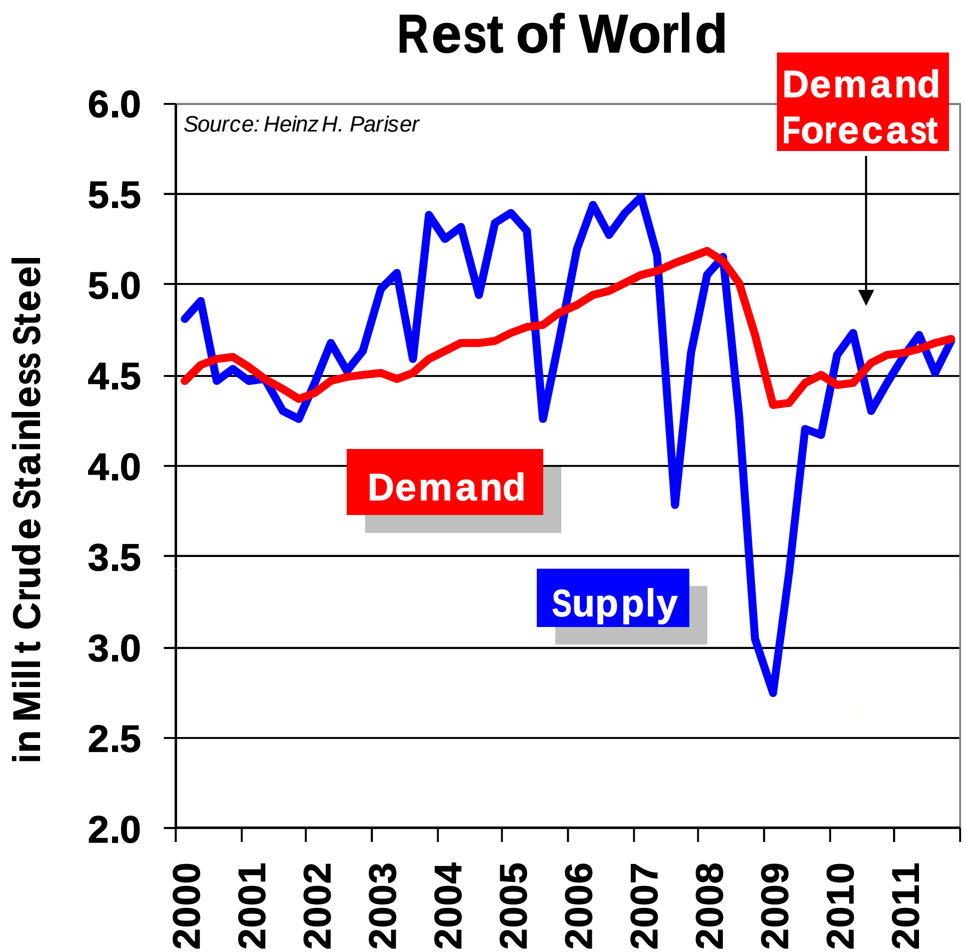


# Crude Stainless Steel Production

| | 2008 | 2009 | Change 09/08 in % | 2010 | Change 10/09 in % |
|---|---|---|---|---|---|
| | in ´000 t | | | in ´000 t | |
| NAFTA | 1,925 | 1,618 | -16.0 | 2,431 | 50.2 |
| European Union | 7,828 | 5,974 | -23.7 | 7,366 | 23.3 |
| Japan | 3,564 | 2,607 | -26.9 | 3,375 | 29.5 |
| S. Korea/Taiwan/India | 4,458 | 4,811 | 7.9 | 5,605 | 16.5 |
| Others | 1,298 | 1,210 | -6.8 | 1,239 | 2.4 |
| Subtotal | 19,074 | 16,220 | -15.0 | 20,015 | 23.4 |
| China | 7,344 | 9,751 | 32.8 | 11,517 | 18.1 |
| Total | 26,418 | 25,971 | -1.7 | 31,532 | 21.4 |

# Stainless Steel Supply & Demand Balance



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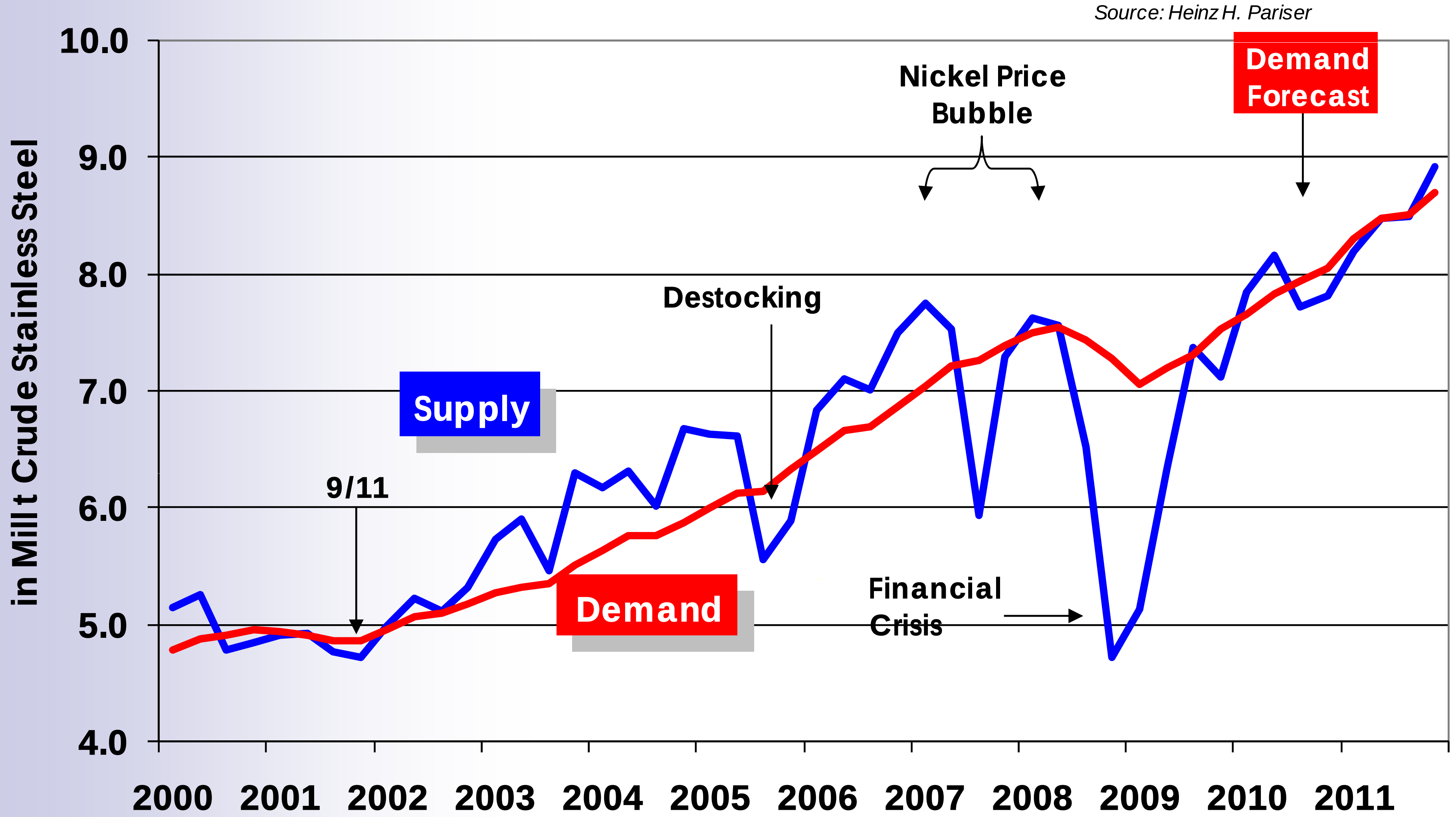
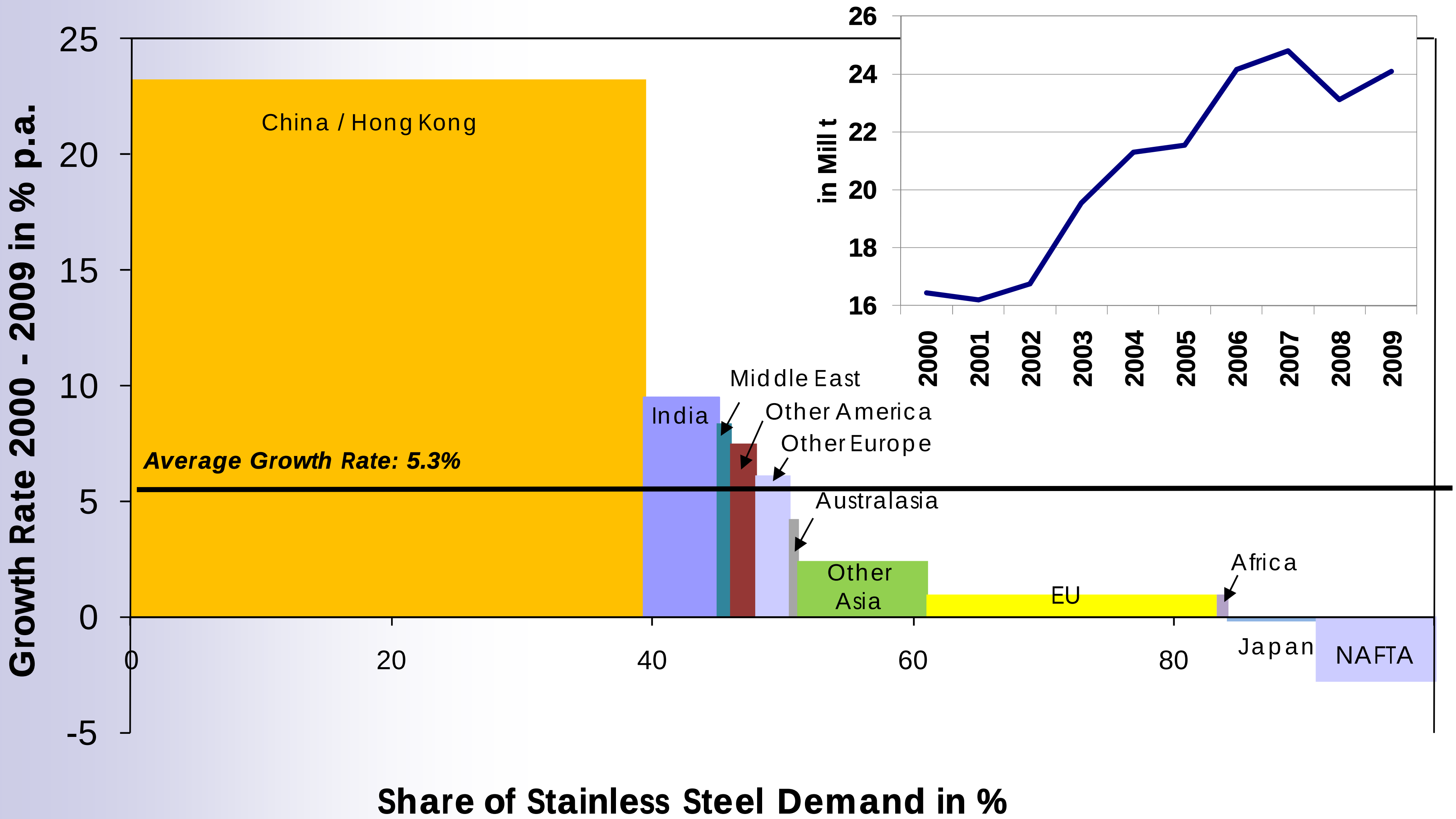
# Stainless Steel Supply & Demand Balance



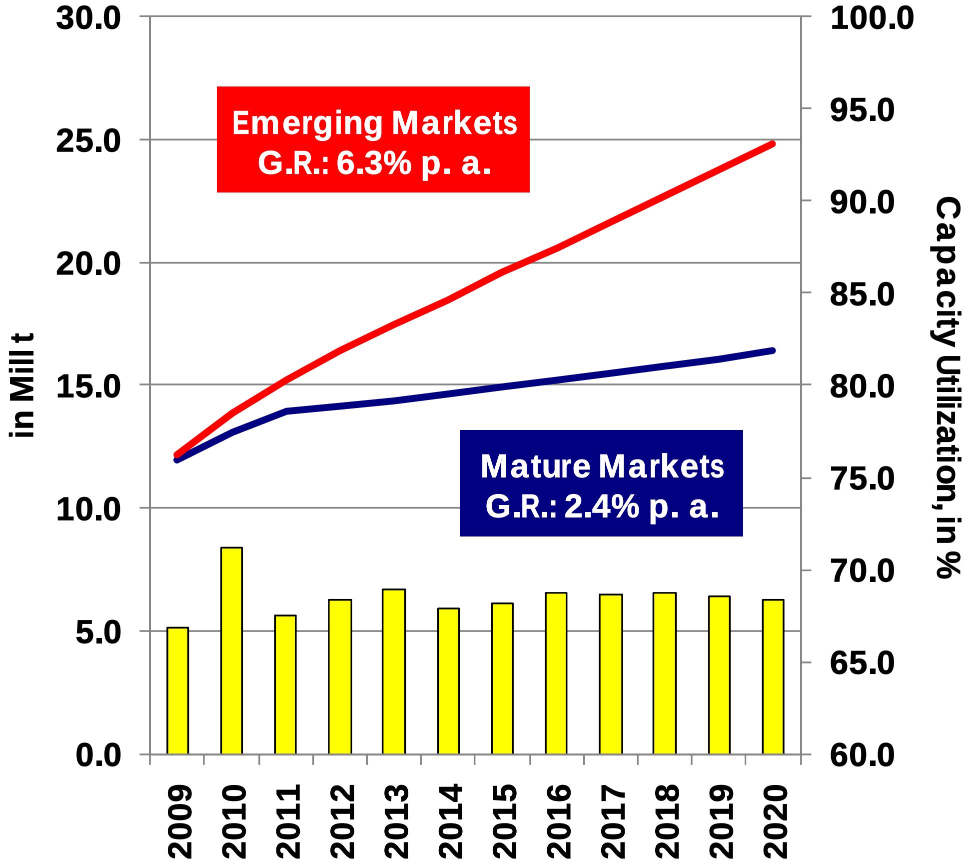
# Stainless Steel Demand Structure 2009



# Stainless Steel Future Demand

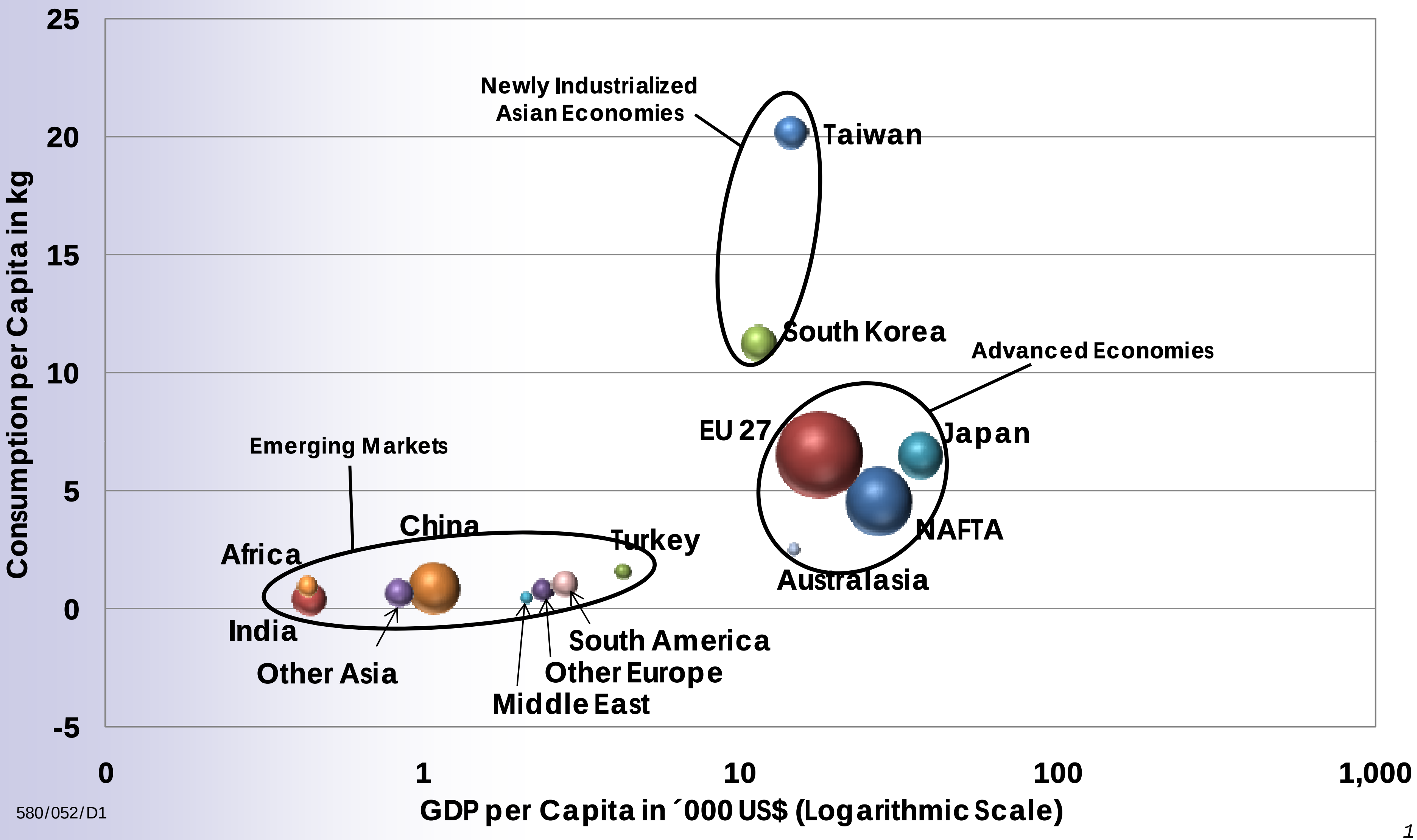
Flat & Long Products

| | 2009 | 2015 | 2020 | Growth Rates 00-09 | 09-20 |
|---|---|---|---|---|---|
| | in Mill t | | | in % | |
| Mature Markets | 11.9 | 14.9 | 16.4 | 0.3 | 2.4 |
| Emerging Markets | 12.1 | 19.6 | 24.8 | 16.6 | 6.3 |
| **Total** | **24.1** | **34.5** | **41.2** | **5.3** | **4.6** |
| **Capacities** | **36.0** | **50.6** | **60.3** | | |
| **Capacity Utilization** | **66.9** | **68.2** | **68.3** | | |



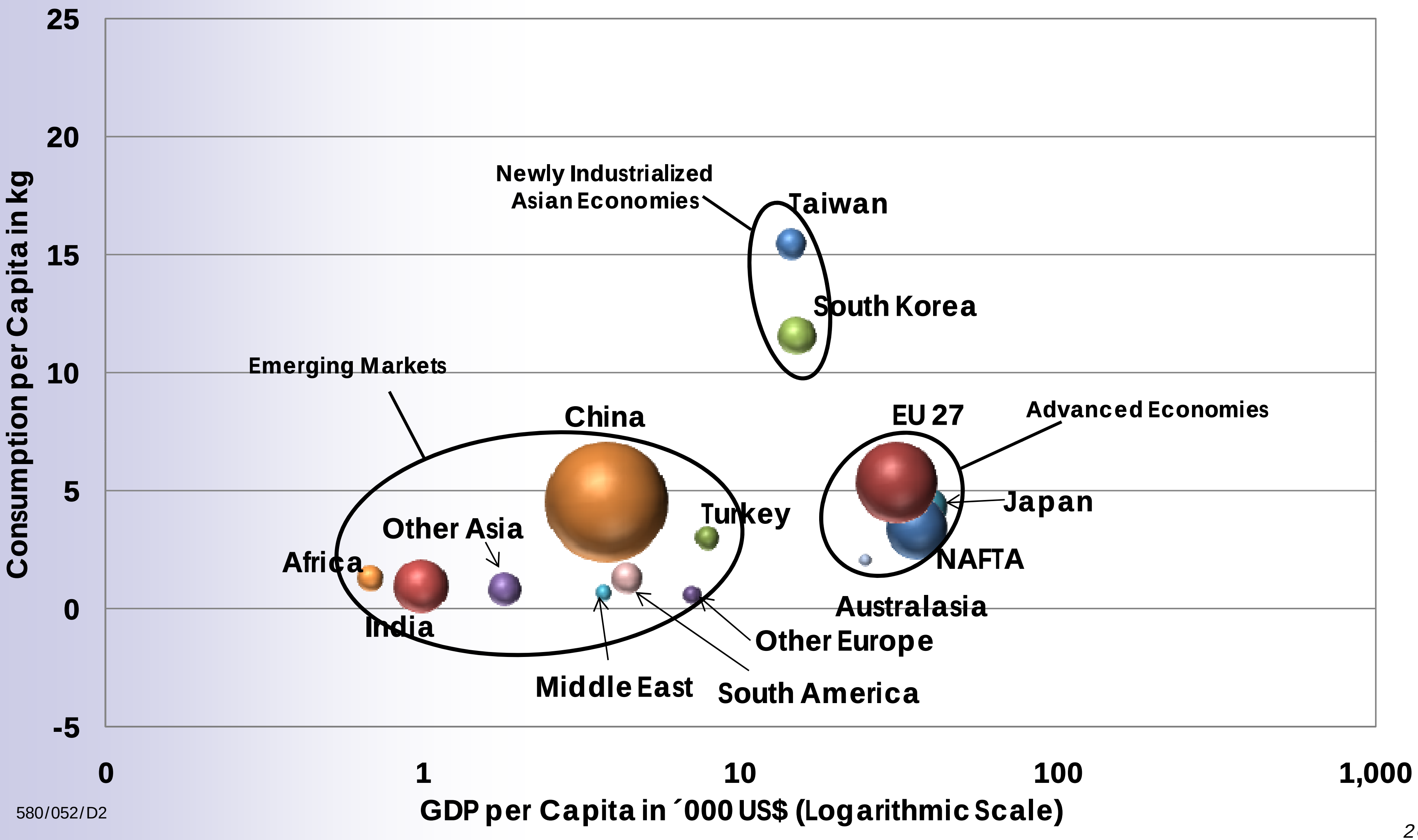
# Stanless Intensity vs. GDP per Capita 2000

(Cold Rolled Flat Products)



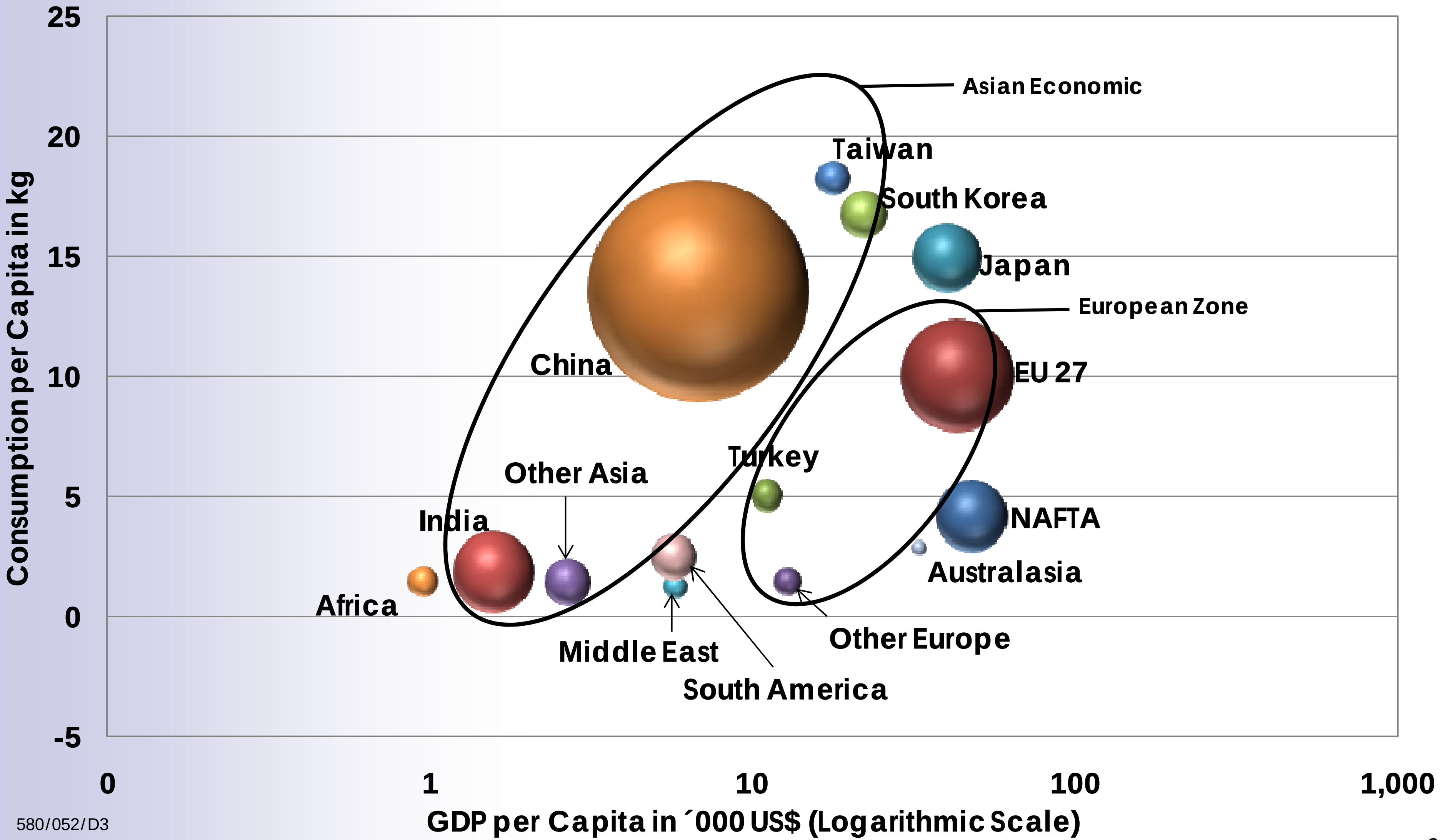
# Stanless Intensity vs. GDP per Capita 2009

(Cold Rolled Flat Products)



# Stanless Intensity vs. GDP per Capita 2020

(Cold Rolled Flat Products)



# The Chrome Industry

# World Chromite Ore Reserve / Mine Production

| | Chromite Ore Reserve in Mill t | in % | Rank | Chromite Ore Output in Mill t | in % |
|---|---|---|---|---|---|
| South Africa | 5,500 | 72 | 1 | 10.6 *) | 49.6 |
| Zimbabwe | 930 | 12 | 2 | 0.1 | 0.3 |
| Kazakhstan | 387 | 5 | 3 | 3.2 | 15.2 |
| Finland | 120 | 1.6 | 4 | 0.2 | 1.2 |
| Turkey | 70 | 0.9 | 5 | 1.6 | 7.4 |
| India | 67 | 0.9 | 6 | 2.4 | 11.3 |
| Brazil | 17 | 0.2 | 7 | 0.6 | 2.7 |
| Others | 576 | 7.5 | 8 | 2.6 | 12.3 |
| **Total** | **7,667** | **100.0** | | **21.4** | **100.0** |

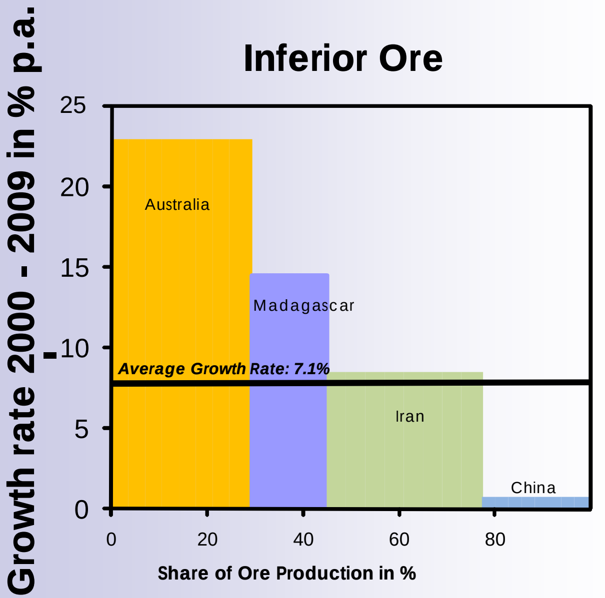
**) incl. UG2*

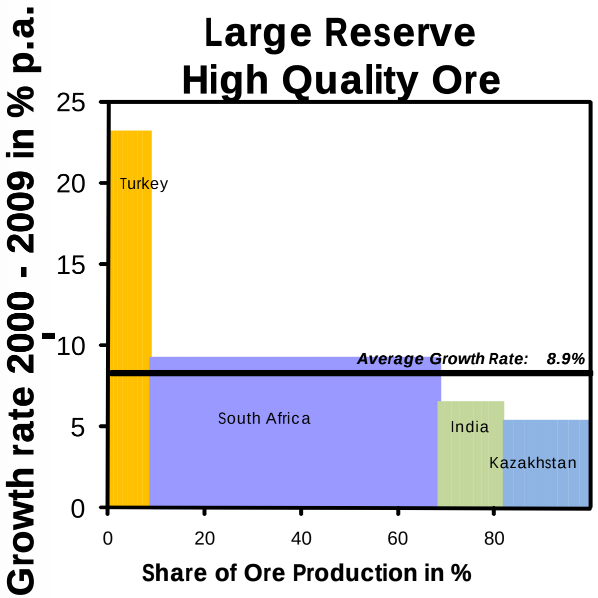
*Source: Department of Mineral & Energy South Africa, Heinz H. Pariser*

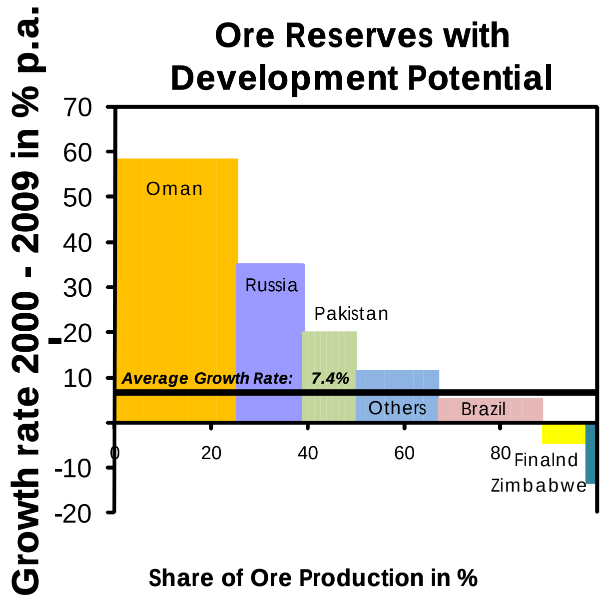
# Regional Development

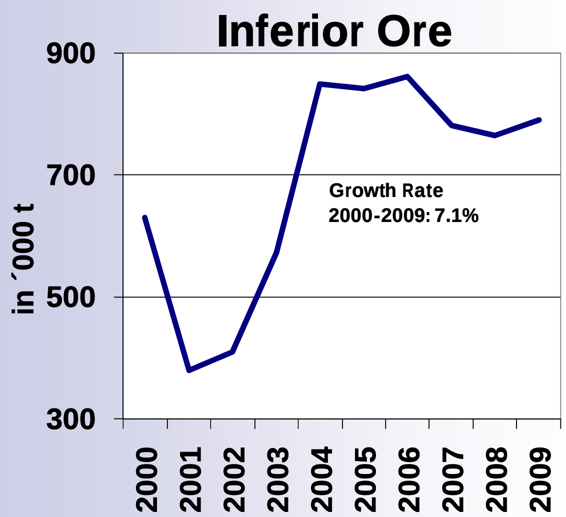
| | 2007 | 2008 | 2009 | G.R. 00-09 | Change 09/08 |
|---|---|---|---|---|---|
| | | in ´000 t | | in % | |
| America | 626 | 787 | 586 | 4.7 | -25.6 |
| EU 27 | 556 | 614 | 247 | -4.8 | -59.7 |
| Other Europe | 2,779 | 3,003 | 2,177 | 24.8 | -27.5 |
| Other Asia | 4,017 | 4,037 | 3,454 | 5.8 | -14.4 |
| Middle East | 870 | 1,435 | 1,272 | 23.9 | -11.4 |
| South Africa | 12,151 | 14,064 | 10,590 | 9.2 | -24.7 |
| Other Africa | 801 | 640 | 207 | -7.5 | -67.7 |
| Australia | 253 | 225 | 231 | 23.0 | 2.7 |
| Subtotal | 22,054 | 24,805 | 18,763 | 8.9 | -24.4 |
| China | 220 | 220 | 180 | 0.7 | -18.2 |
| India | 3,320 | 3,900 | 2,414 | 6.5 | -38.1 |
| Subtotal | 3,540 | 4,120 | 2,594 | 6.1 | -37.0 |
| Total | 25,594 | 28,925 | 21,357 | 8.5 | -26.2 |

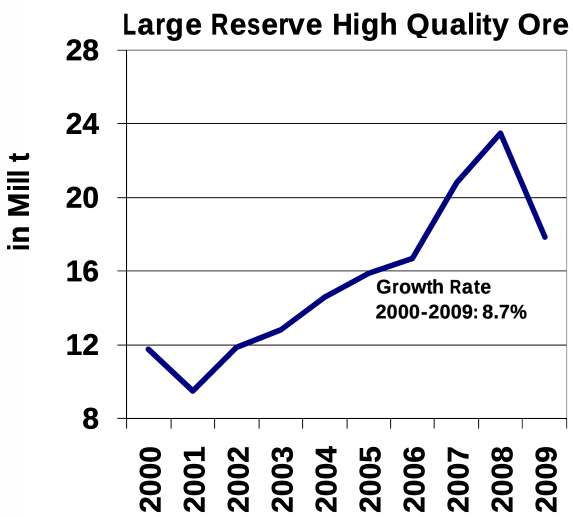
# Development of Cr Mine Production

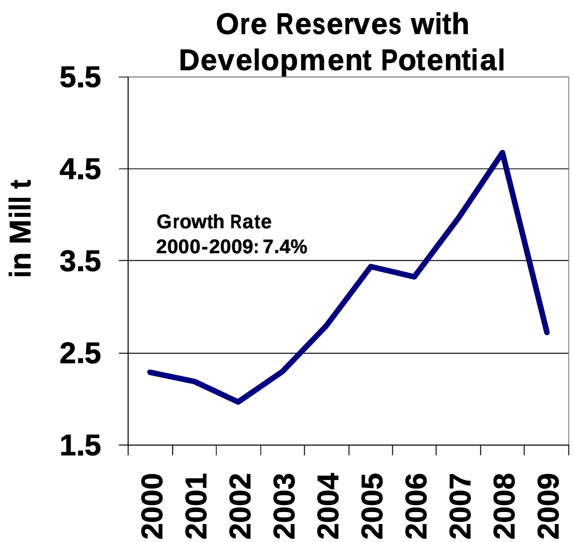


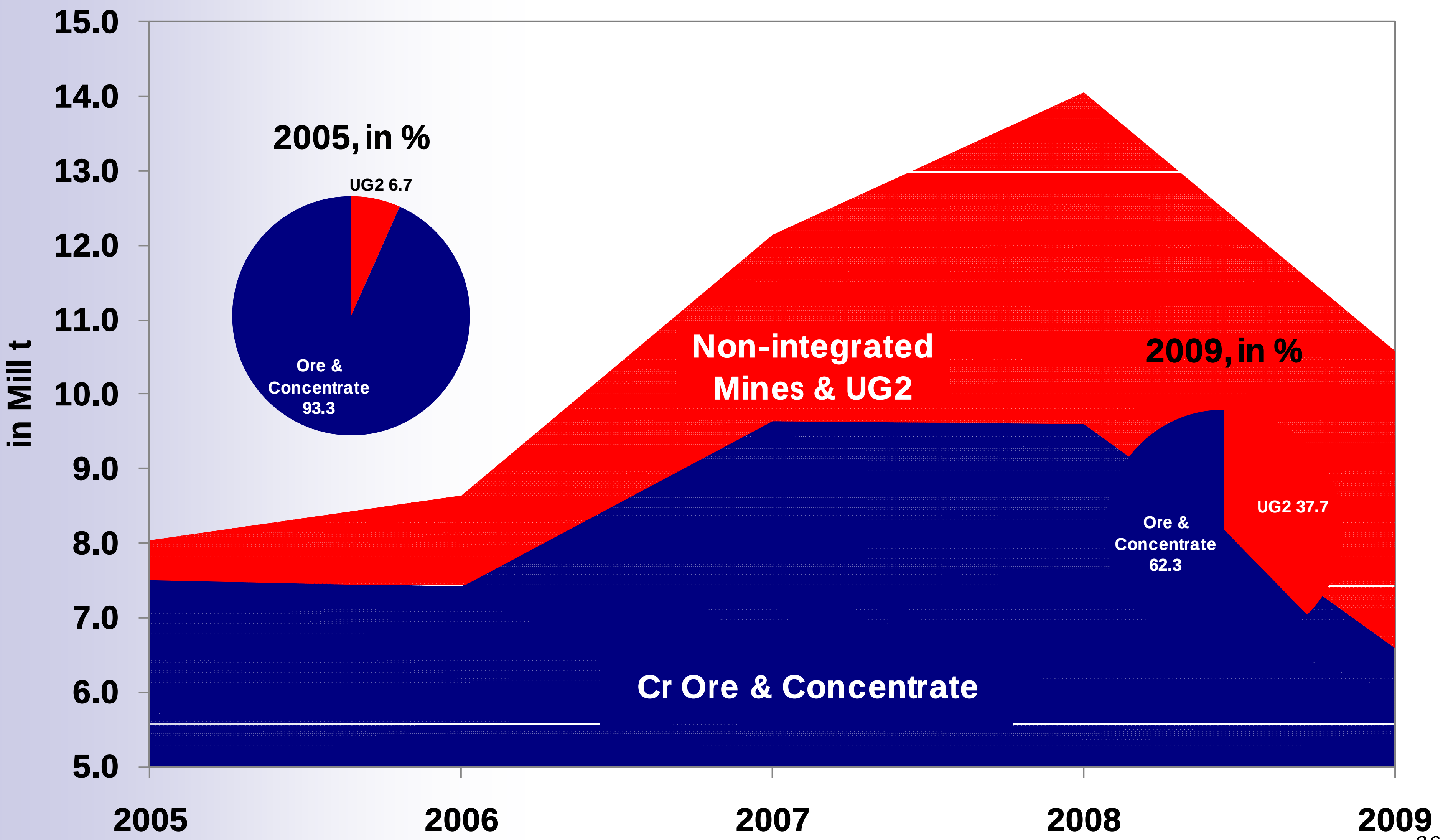



# South Africa´s Cr Ore Output



# Pyrometallurgical Processing of Chromite

| | Blast Furnace | AC Furnace Technology | AC Furnace + Preheating / + Prereduction | DC Furnace Technology |
|---|---|---|---|---|
| | **Japan, Brazil** | **Kazakhstan, China, India, etc.** | **S. Africa, Kazakhstan, Finland, etc.** | **S. Africa 2x** |
| **Strength** | • Direct use of Cr ore<br>• Optimum process for ferritic stainless | • Standard technology,<br>• Widely applied | • State of the art<br>• Reduced energy input | • Usage of fines,<br>• High rate of recovery |
| **Weakness** | • Un-flexible<br>• Integrated into steel plant | • High Energy Usage<br>• Environmental issues | • Pre-reduction difficult to control | • Highest energy consumption,<br>• Advanced technology |

?

# Production of Charge / HC FeCr

| | 2008 | 2009 | Change 09/08 | 2010 | Change 10/09 |
|---|---|---|---|---|---|
| | in ´000 t | | in % | in ´000 t | in % |
| Brazil | 187 | 113 | -39.3 | 182 | 61.0 |
| EU 27 | 356 | 161 | -54.7 | 335 | 107.8 |
| Russia, Turkey, Albania | 531 | 316 | -40.5 | 489 | 55.0 |
| India | 750 | 765 | 2.0 | 975 | 27.4 |
| Kazakhstan | 955 | 982 | 2.8 | 1,076 | 9.6 |
| South Africa | 3,239 | 2,179 | -32.7 | 3,527 | 61.9 |
| Zimbabwe | 152 | 100 | -34.1 | 158 | 57.9 |
| Iran | 10 | 15 | 50.0 | 15 | 0.0 |
| Subtotal | 6,179 | 4,631 | -25.1 | 6,757 | 45.9 |
| China | 1,284 | 1,246 | -2.9 | 1,460 | 17.2 |
| Total | 7,463 | 5,877 | -21.2 | 8,217 | 39.8 |
| Charge Cr | 3,741 | 2,440 | -34.8 | 4,012 | 64.4 |
| HC FeCr | 3,722 | 3,437 | 13.0 | 4,205 | 22.4 |

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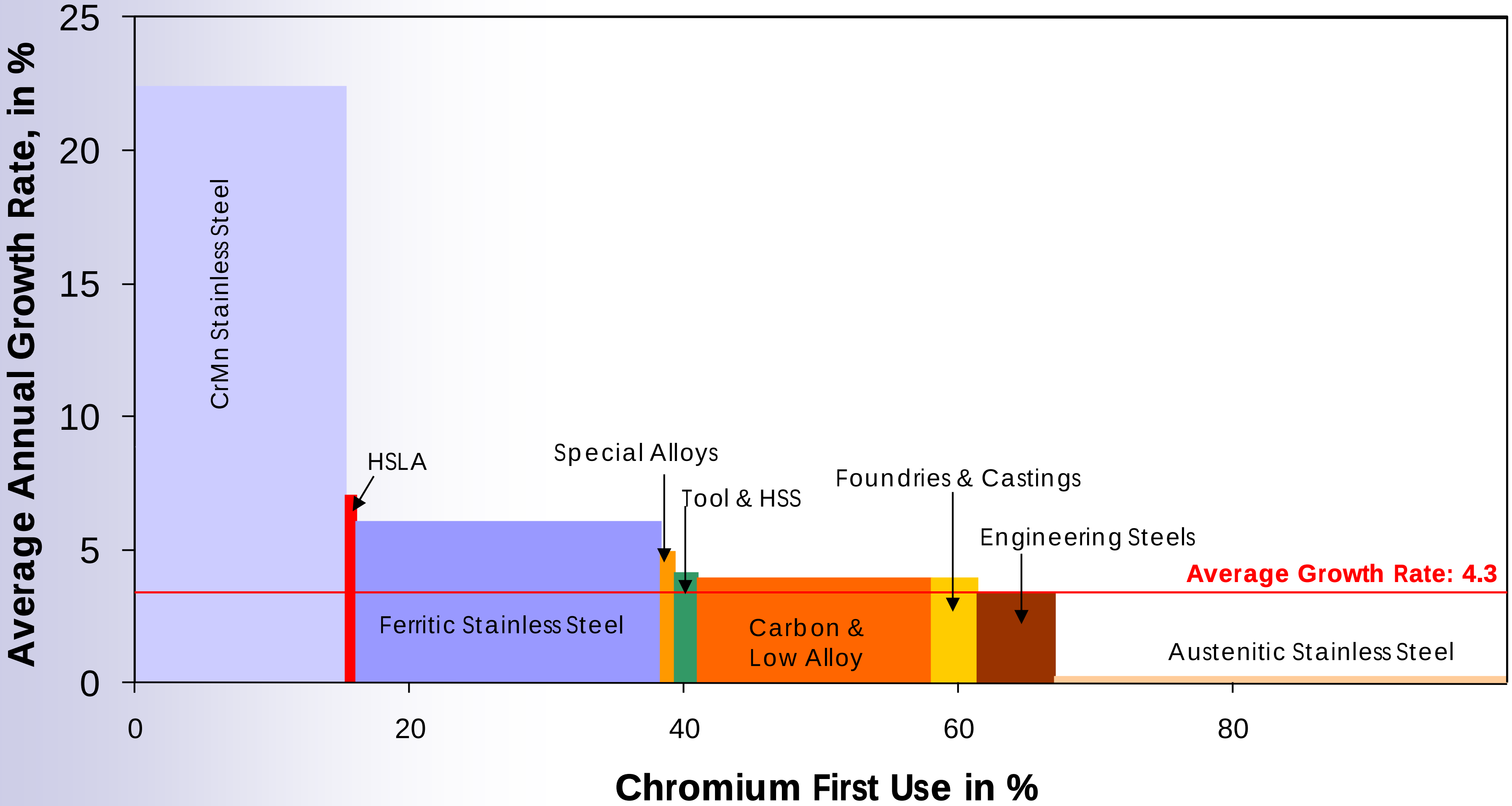
# First Use Structure Chrome Units 2009



# Apparent Consumption of Charge / HC FeCr

| | 2008 | 2009 | Change 09/08 | 2010 | Change 10/09 |
|---|---|---|---|---|---|
| | in ´000 t | | in % | in ´000 t | in % |
| NAFTA | 502 | 223 | -55.7 | 456 | 104.9 |
| EU | 1,993 | 1,267 | -36.4 | 1,655 | 30.6 |
| Japan | 831 | 459 | -44.8 | 695 | 51.5 |
| S. Korea/Taiwan | 716 | 741 | 3.4 | 959 | 29.5 |
| Others | 633 | 616 | -2.7 | 632 | 2.6 |
| Subtotal | 4,675 | 3,305 | -29.3 | 4,397 | 33.0 |
| China | 2,352 | 3,218 | 36.8 | 3,838 | 19.3 |
| India | 174 | 557 | 220.7 | 582 | 4.5 |
| Subtotal | 2,526 | 3,774 | 49.4 | 4,420 | 17.1 |
| Total | 7,201 | 7,080 | -1.7 | 8,817 | 24.5 |

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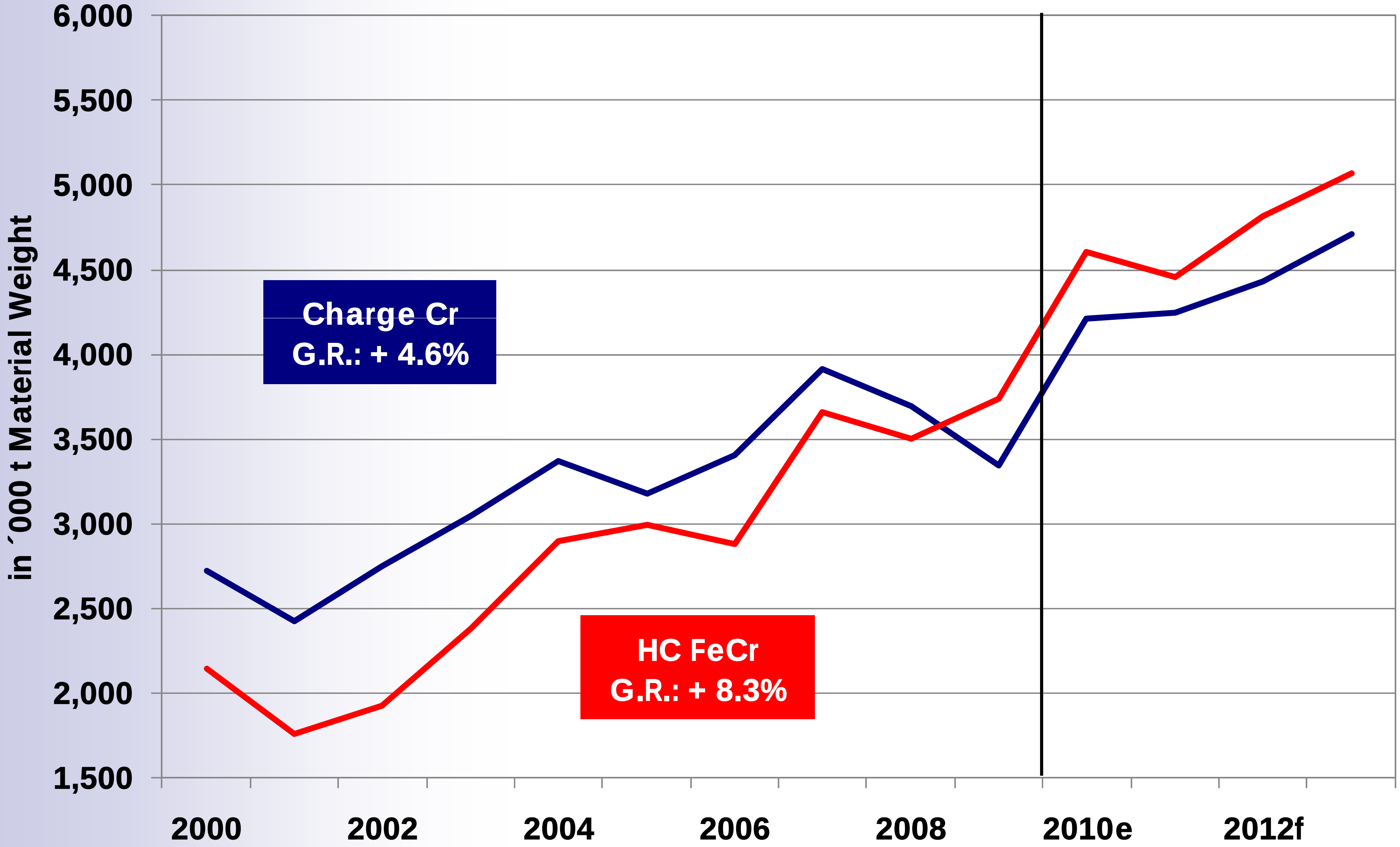
# FeCr Demand Historic Development



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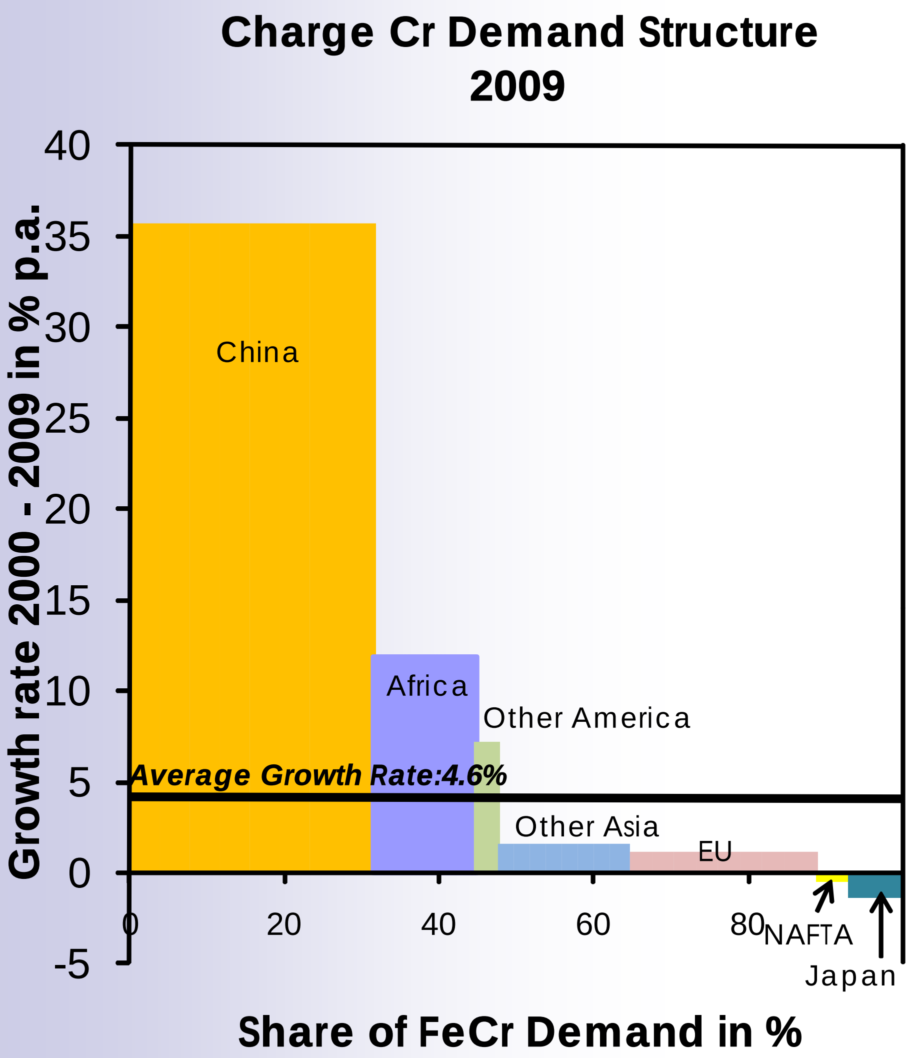
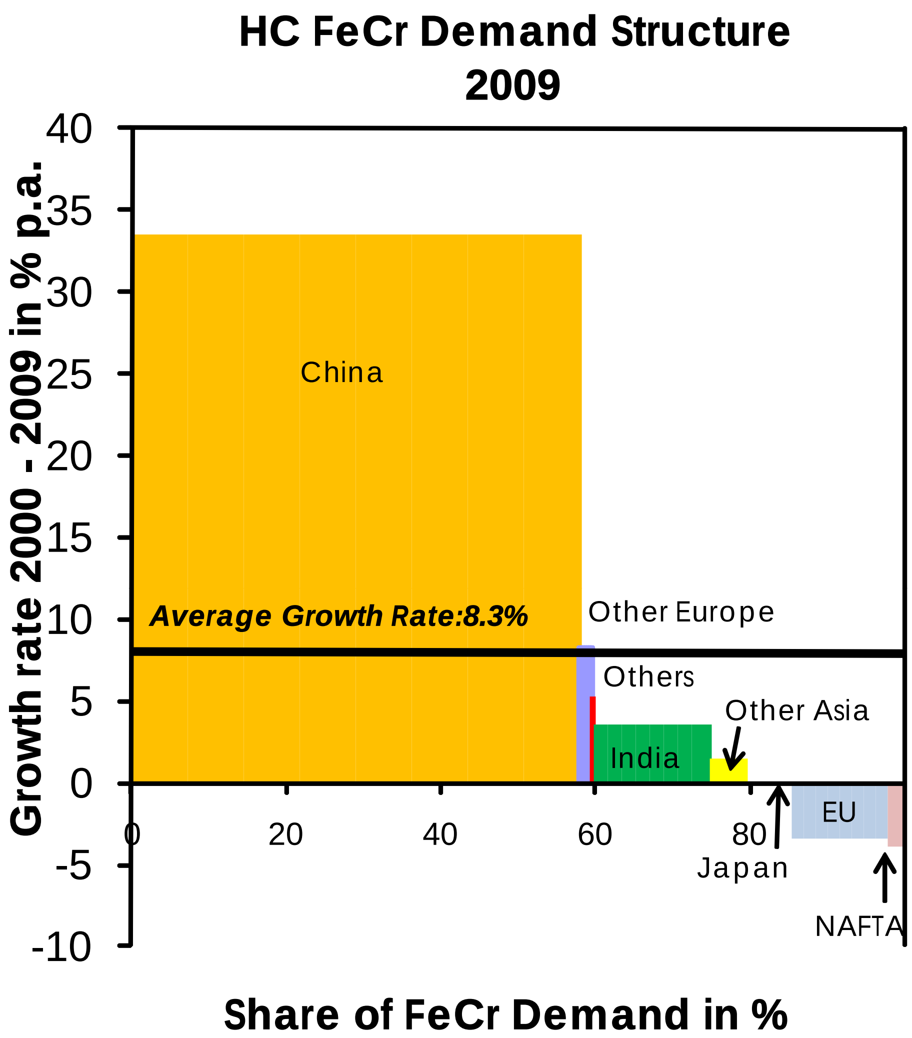
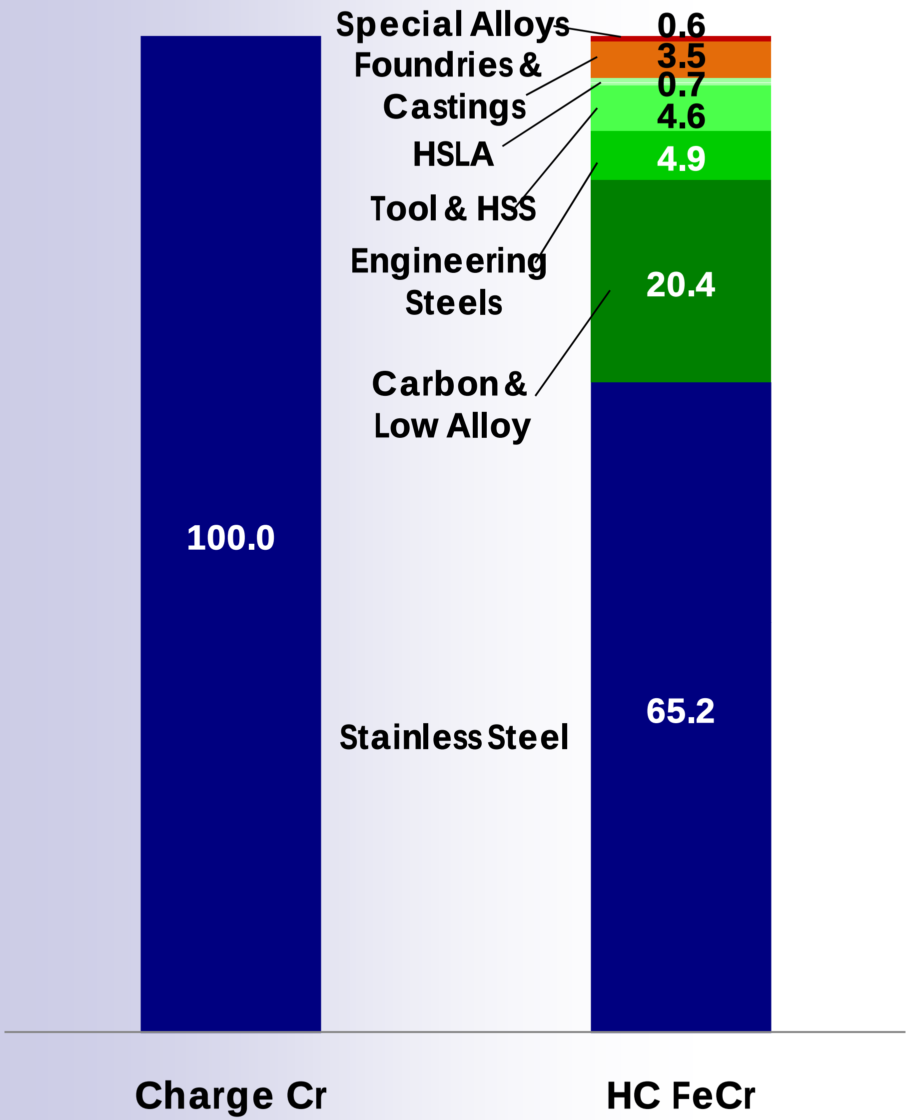
# Regional Demand Development



# Widening Gap between Charge & HC FeCr




**Charge Cr:**

Few, large volume stainless producers in "old economies"

**High Carbon FeCr:**

Numerous medium and small stainless producers in new markets

Broad range of First Use applications

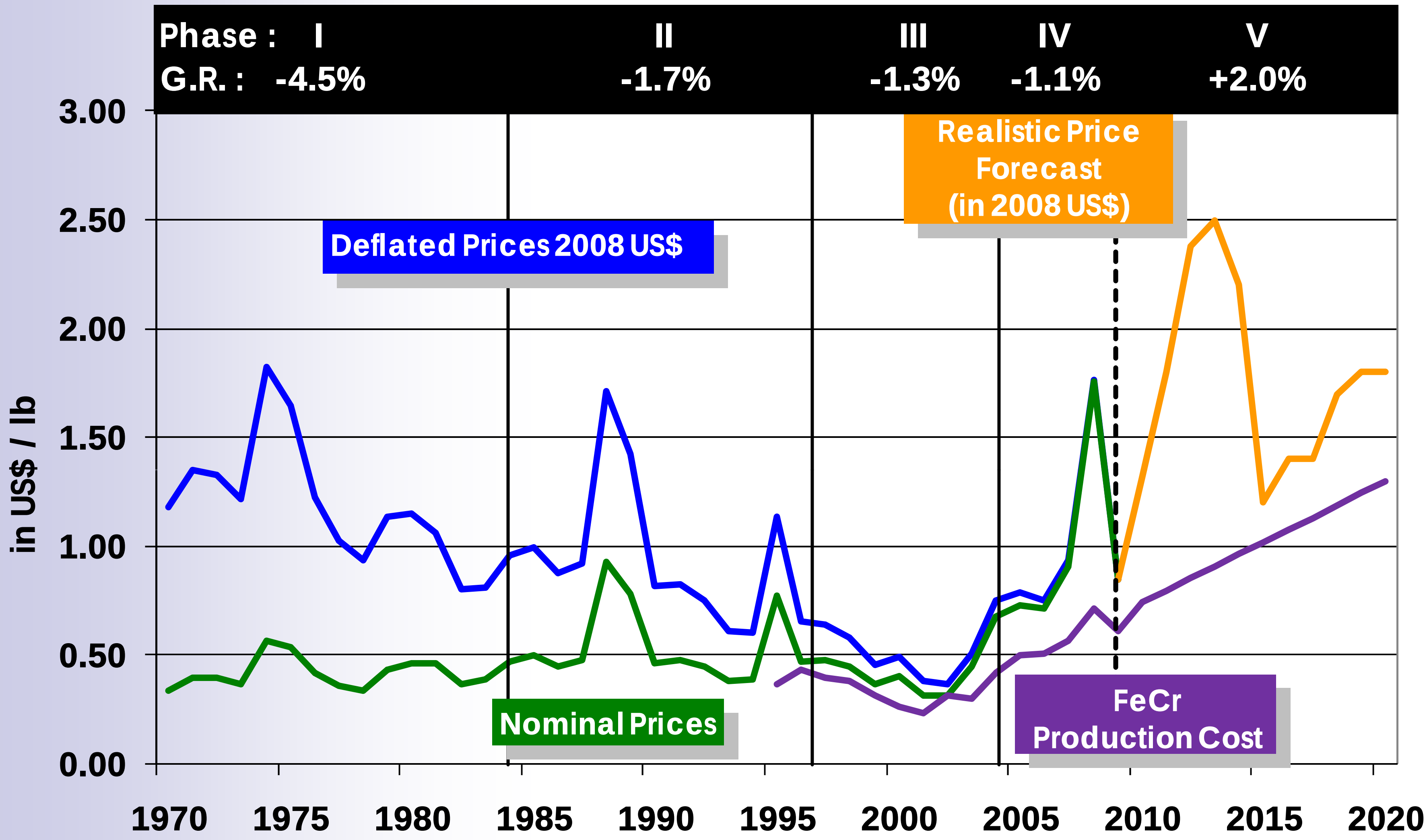
Logistics and distribution are significant marketing aspects!

# FeCr Supply & Demand Balance

(Charge and High Carbon FeCr)

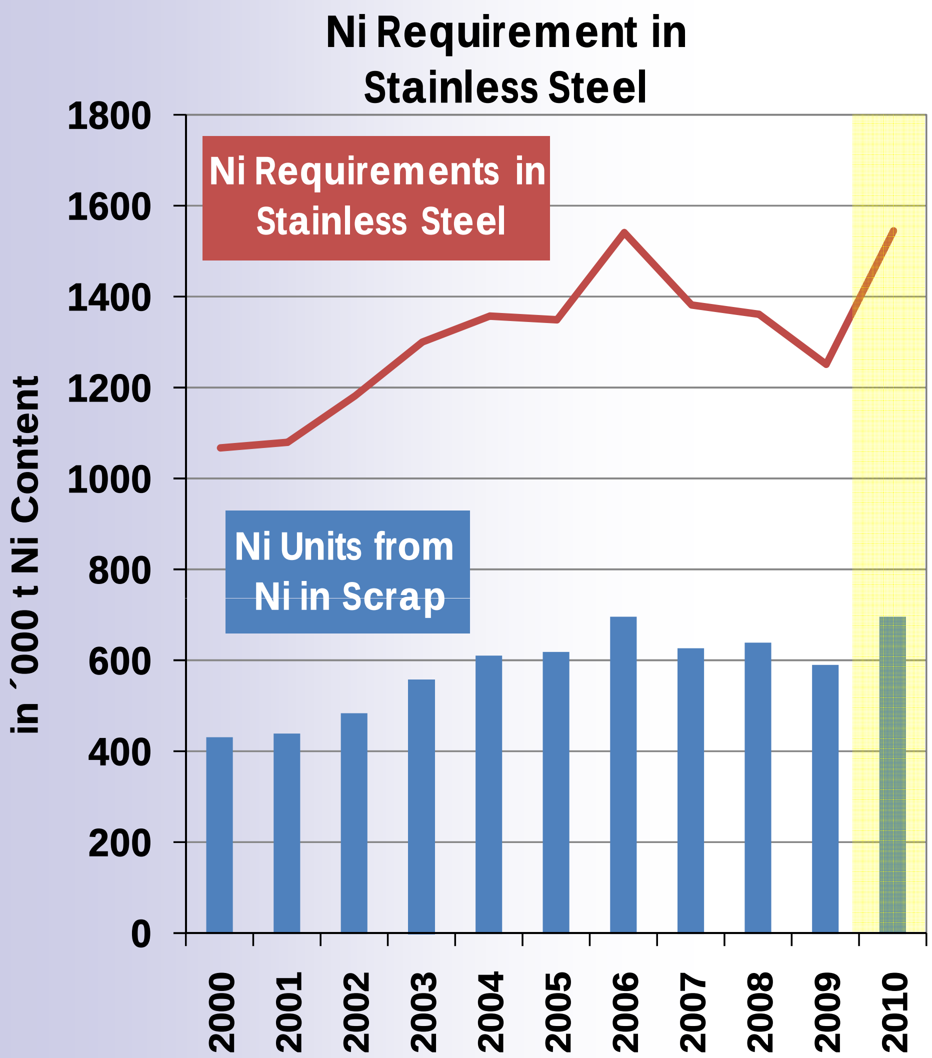
| | 2009 | 2010 Q1 | 2010 Q2 | 2010 Q3 | 2010 Q4 | 2010 Year |
|---|---|---|---|---|---|---|
| | | | ´000 t | | | |
| **Demand** | **7,080** | 2,039 | 2,309 | 2,241 | 2,228 | **8,817** |
| **Supply** | | | | | | |
| - Cr Production | **5,877** | 2,120 | 2,134 | 1,958 | 2,005 | **8,217** |
| - Capacity | **9,024** | 2,293 | 2,293 | 2,293 | 2,293 | **9,172** |
| - Utilisation (in %) | **65.1** | 92.4 | 93.1 | 85.4 | 87.4 | **89.6** |
| **Supply & Demand Balance** | **-1,202** | **81** | **-175** | **-282** | **-223** | **-600** |
| **Charge Cr Prices in $ / lb** | **0.85** | **1.01** | **1.36** | **1.40** | **1.50** | **1.32** |

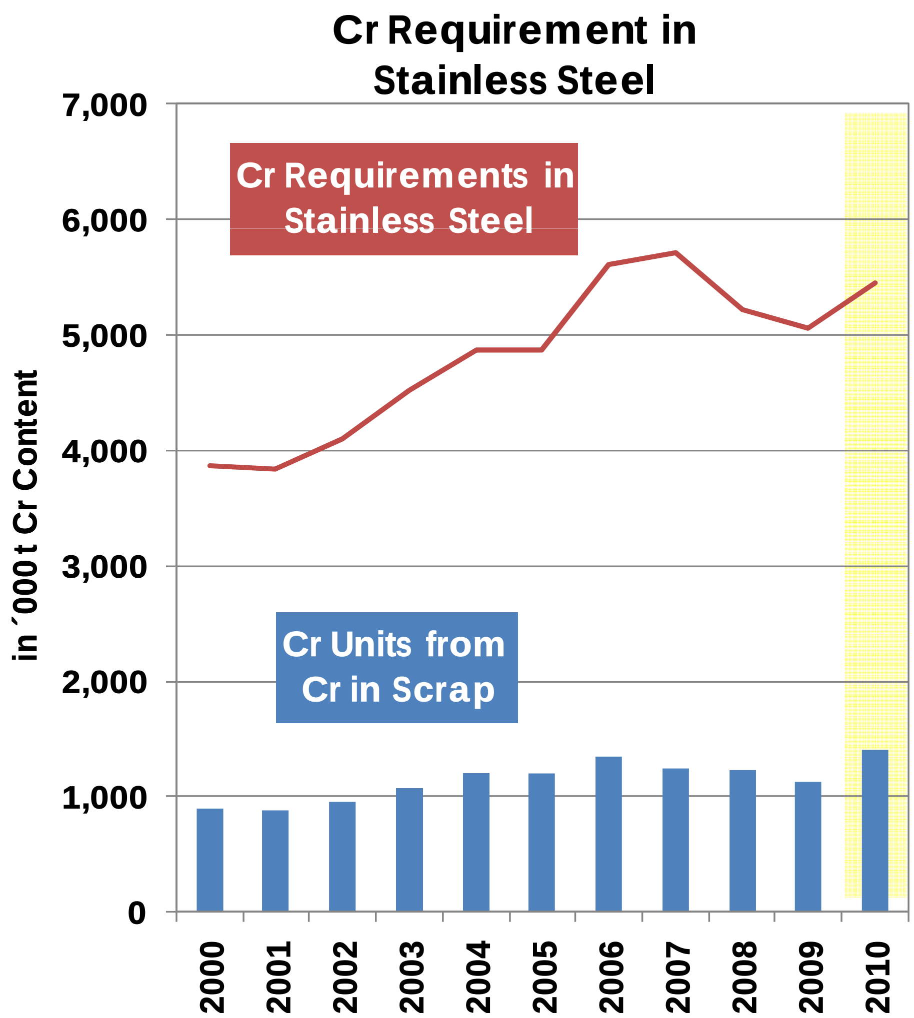
# FeCr Price Development



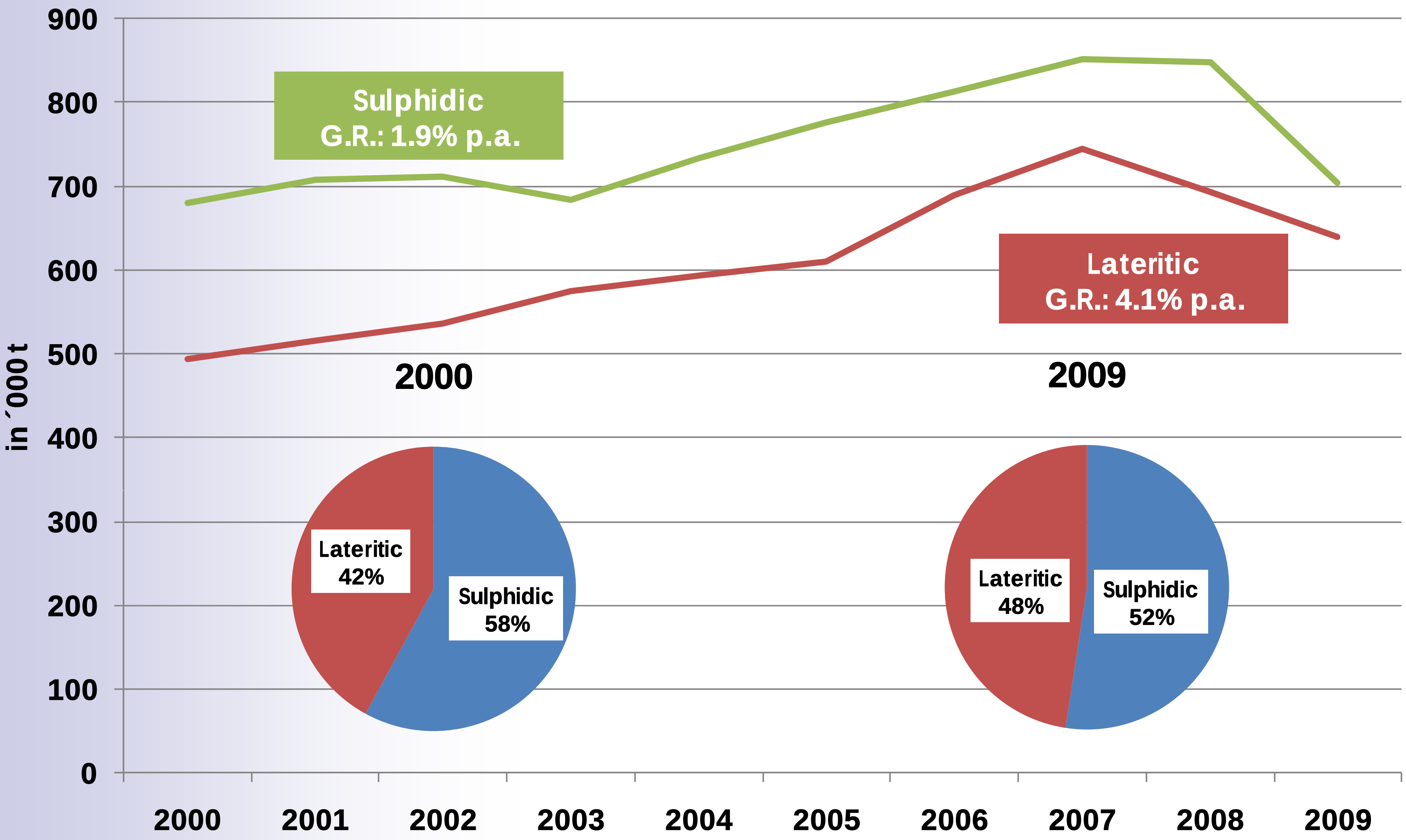
# The Nickel Industry

# Secondary Raw Material Input



# Nickel Mine Production



# Pyrometallurgical Processing of Laterites

**Blast Furnace** — ~ 1900
- Matte smelting
- Not suitable for FeNi production

**Krupp-Renn Process (RK)** — ~ 1930s
- Reduction in RK
- Still in operation at NYK, Oheyama
- First FeNi process at LARCO (1950s)

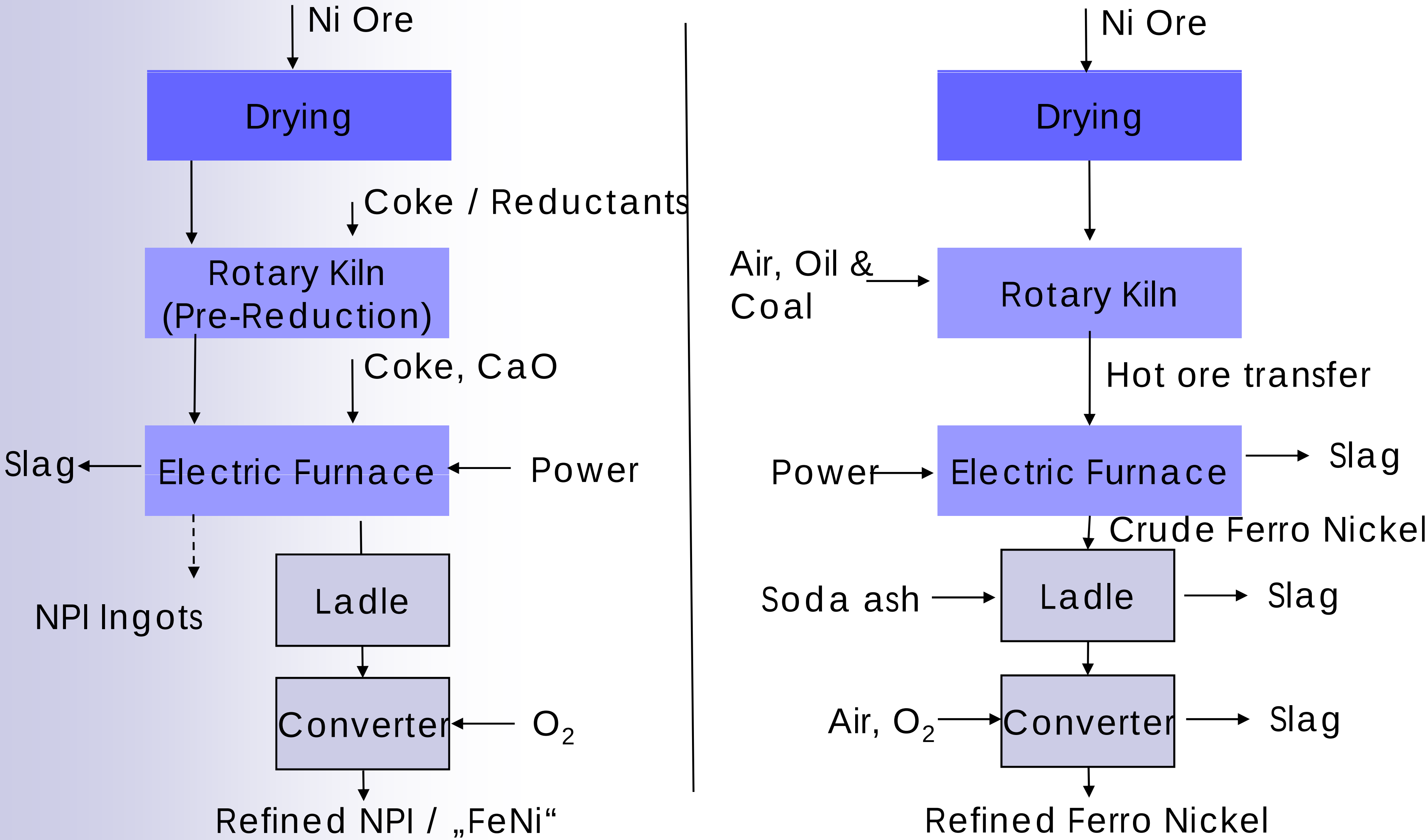
**Rotary Kiln + EF** — 1950 - 1960s
- 1st generation: drying only
- 2nd generation: pre-reduction
- Final reduction in EF

**NPI - BF** · **NPI - EF** · **NPI - RKEF**

Since 2005
- Using existing technologies
- Low capital expenditure
- Similar, but faster learning curve!

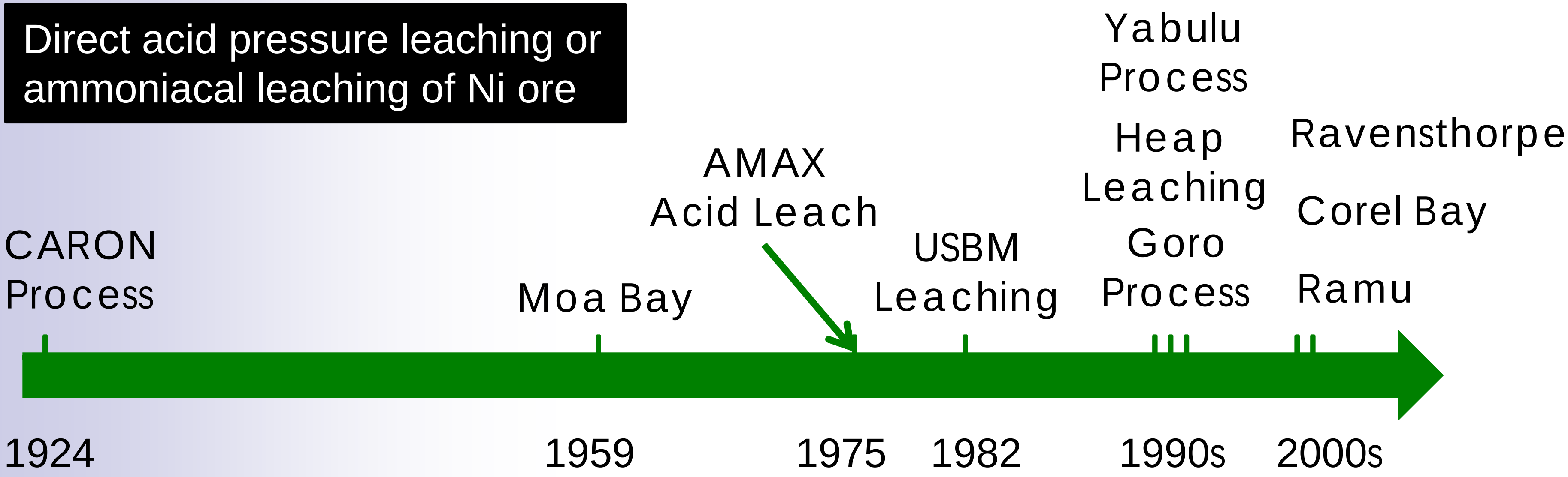
Source: Boldt, J.R. Jr.: The Winning of Nickel, London, 1967
Anthony, M.T.; Flett, D.S.: Nickel Processing Technology: A review, Minerals Industry International, Jan. 1997

# „New“ RKEF NPI vs Typical FeNi Process



# Hydrometallurgical Processing of Laterites

**Direct acid pressure leaching or ammoniacal leaching of Ni ore**




**Nickel Matte Refining**

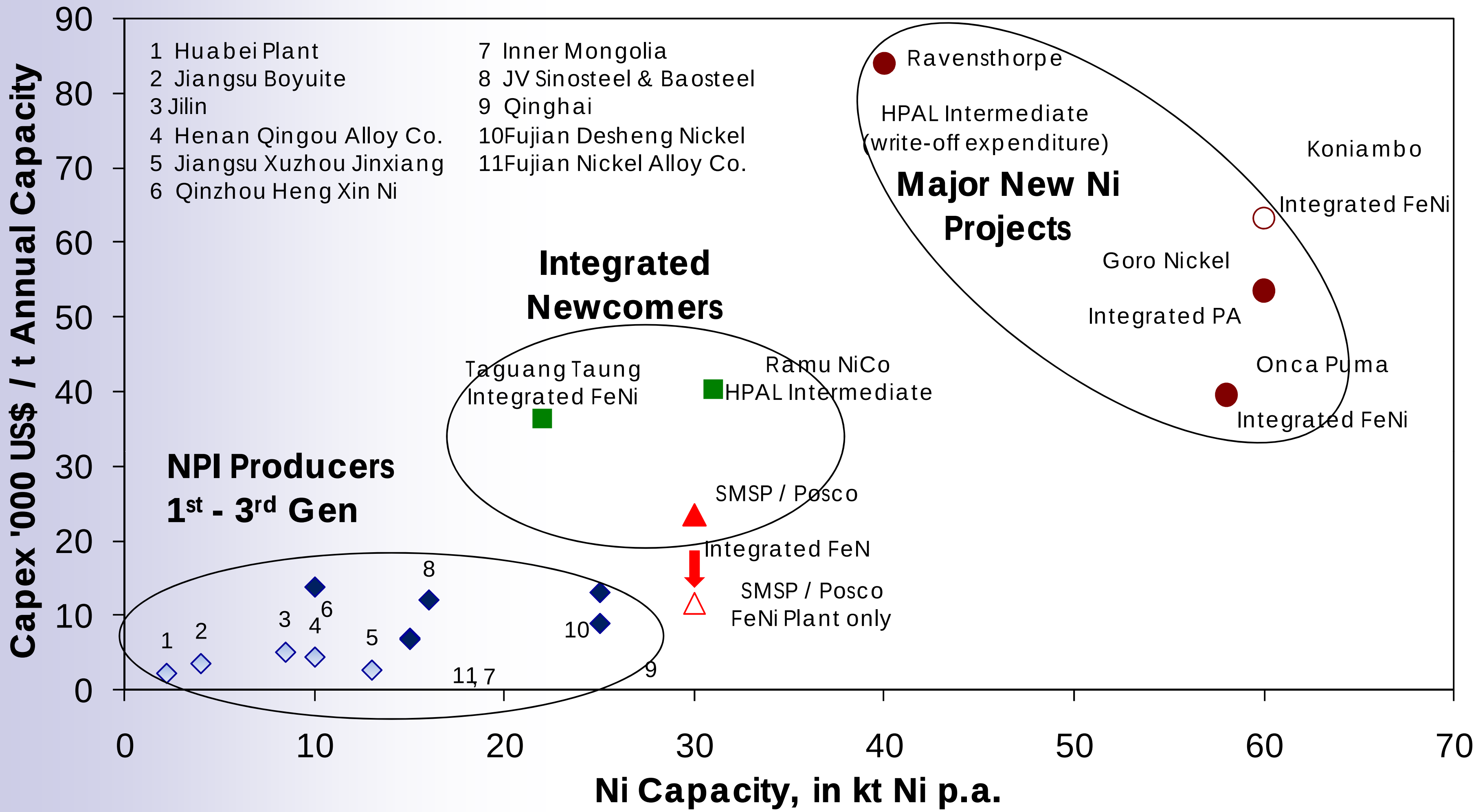
Cl-Leach: e.g. Kristiansand (XSTRATA), Sandouville (Eramet), Sumitomo

S-Leach: e.g. Hjaravalta (NN), Rustenburg (AA), Jinchuan JNMC

Direct leach on NiCu-Sulfide intermediate: Sherritt-Gordon Process

Source: Boldt, J.R. Jr.: The Winning of Nickel, London, 1967
Anthony, M.T.; Flett, D.S.: Nickel Processing Technology: A review, Minerals Industry International, Jan. 1997

# Capital Expenditure Selected Projects



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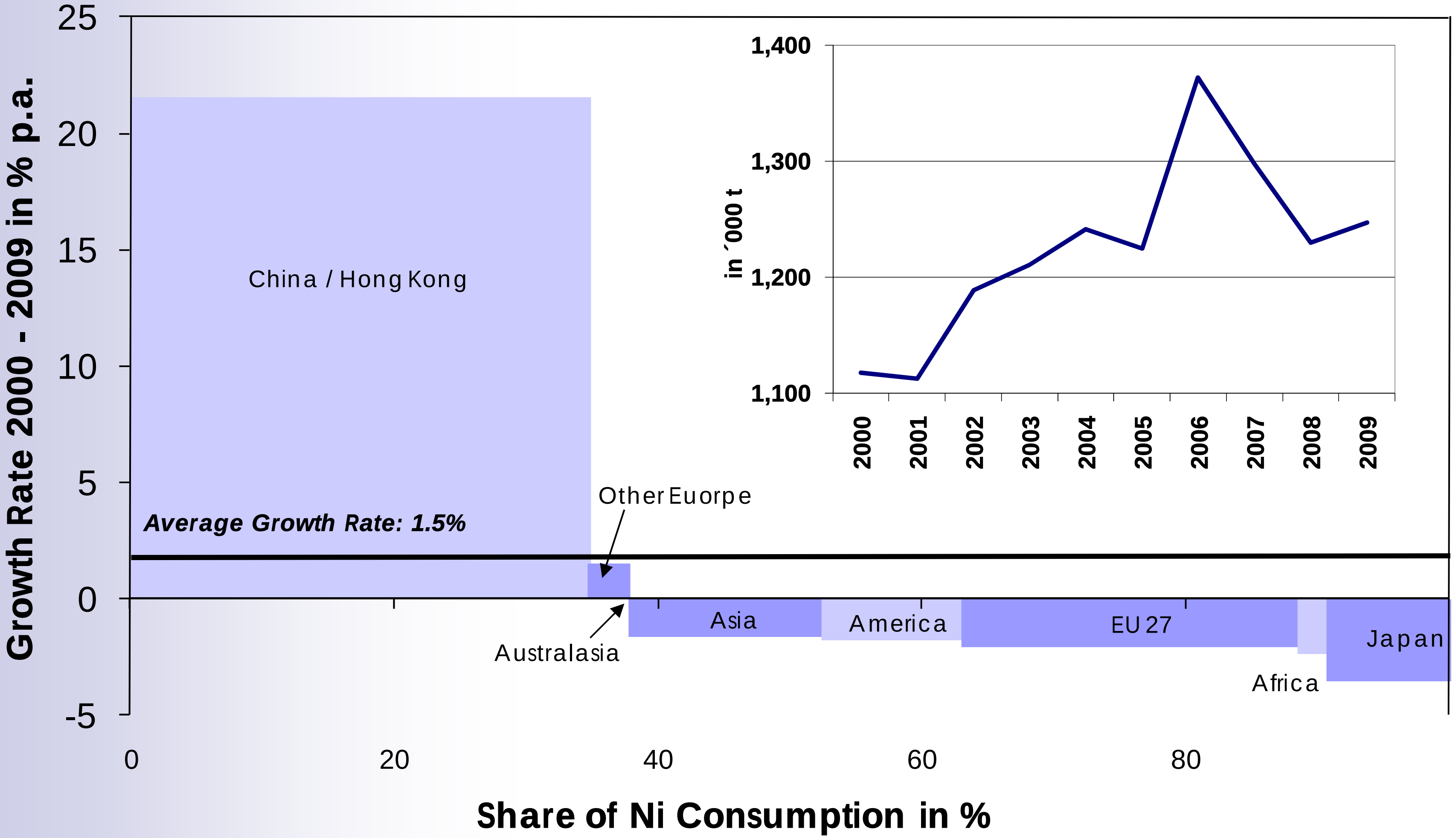
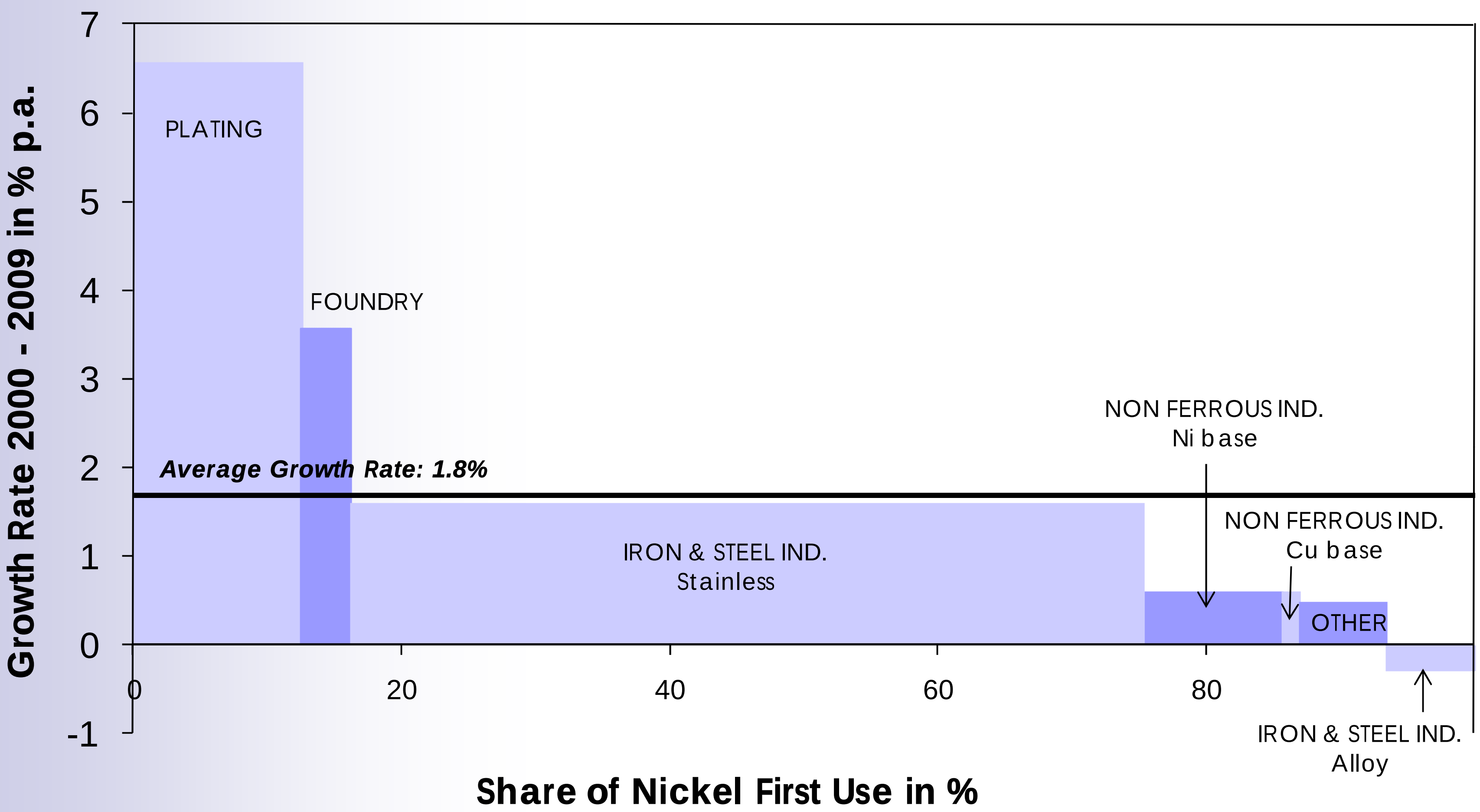
# Regional Demand Development

| | 2008 | 2009 | G.R.: 00 - 09 | 2015 | 2020 | G.R.: 00 - 20 |
|---|---|---|---|---|---|---|
| | in ´000 t | | in % | in ´000 t | | in % |
| America | 158 | 132 | -1.8 | 172 | 181 | 0.3 |
| EU 27 | 370 | 318 | -2.1 | 475 | 497 | 1.0 |
| Other Euorpe | 37 | 37 | 1.5 | 42 | 51 | 1.9 |
| Japan | 158 | 116 | -3.5 | 122 | 119 | -2.9 |
| China / Hong Kong | 325 | 434 | 21.5 | 640 | 816 | 14.7 |
| Asia | 156 | 182 | -1.7 | 234 | 262 | 1.3 |
| Africa | 25 | 27 | -2.4 | 34 | 36 | 0.0 |
| Australasia | 2 | 1 | -0.4 | 2 | 2 | 0.7 |
| **Total** | **1,230** | **1,247** | **1.5** | **1,721** | **1,965** | **3.0** |

# Regional Demand Development Structure 2009



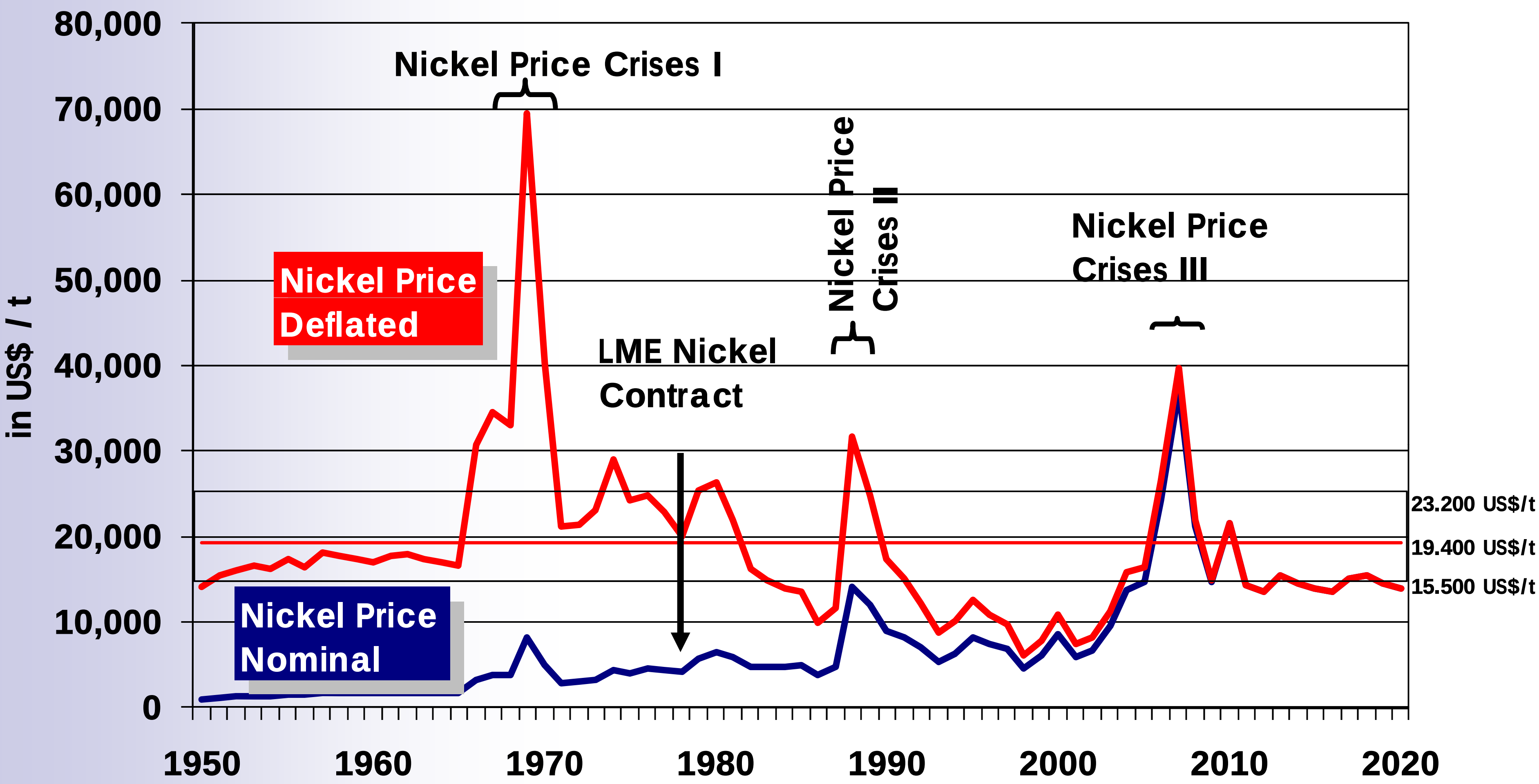
# Nickel First Use Structure 2009



# Nickel Supply & Demand Balance

| ´000 t | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| **Demand** | **1,401** | **1,323** | **1,289** | **1,213** | **1,386** |
| **Supply** | | | | | |
| - Ni Production | 1,364 | 1,445 | 1,382 | 1,332 | 1,395 |
| - Capacity | 1,512 | 1,640 | 1,724 | 1,670 | 1,750 |
| - Utilisation (in %) | 90.2 | 88.1 | 80.1 | 79.7 | 79.7 |
| **Supply & Demand Balance** | **-37** | **122** | **93** | **119** | **10** |
| **LME Nickel Price (US$ / t)** | **24,247** | **37,234** | **21,110** | **14,663** | **21,500** |

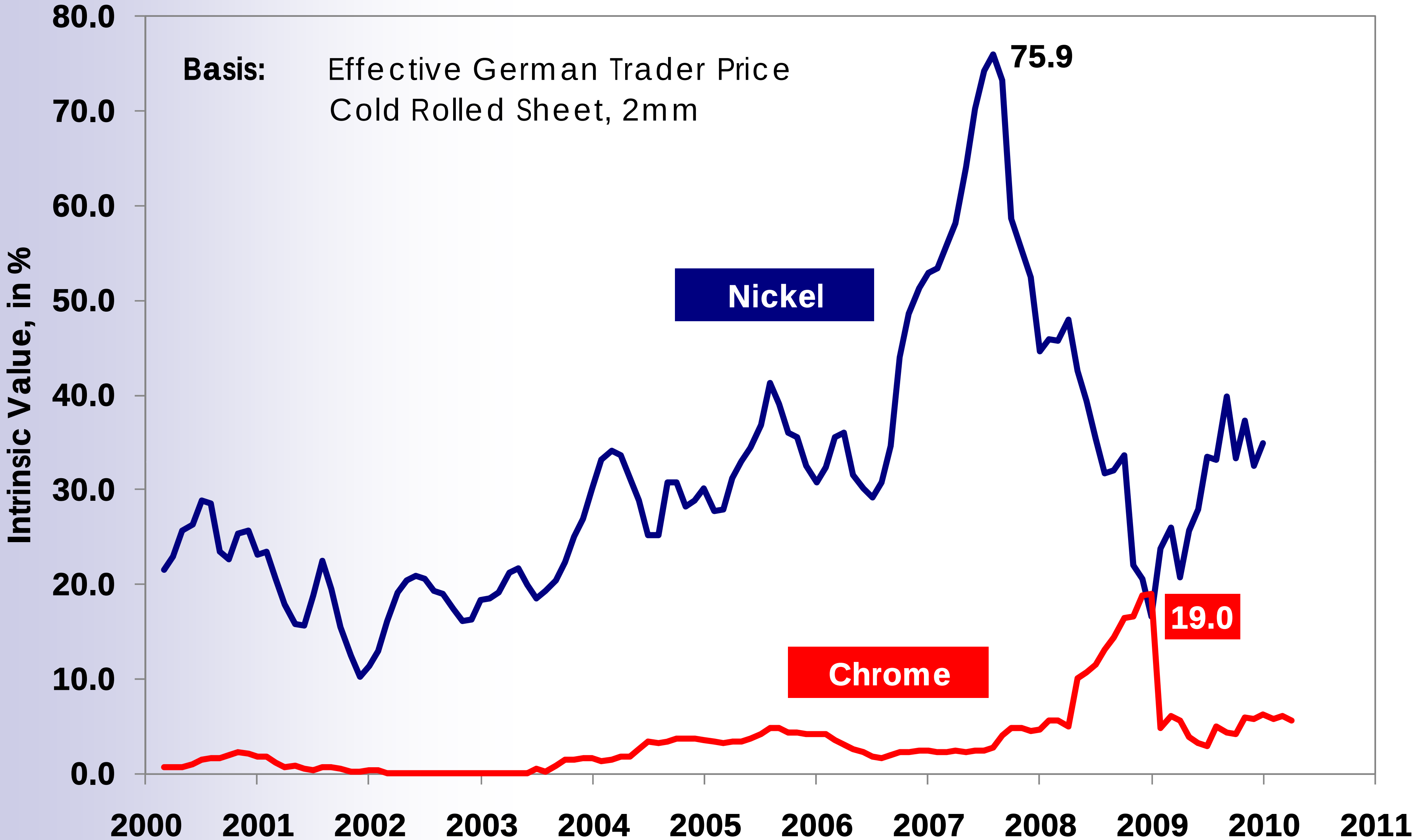
# Nickel Long-term Price Development



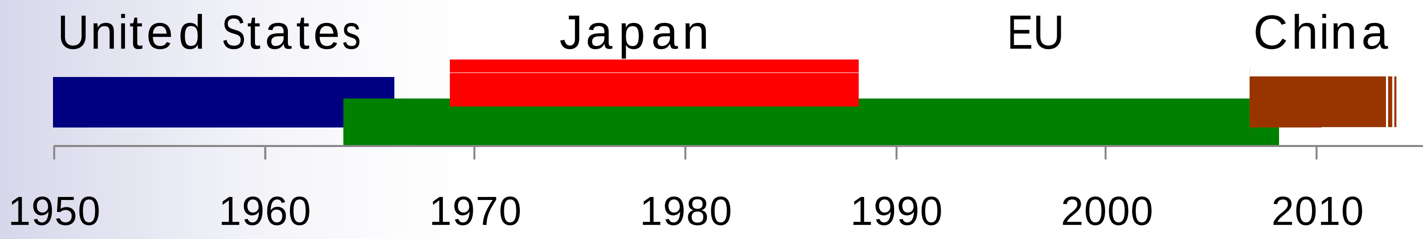
# Conclusion

Heinz H. Pariser
Alloy Metals & Steel
Market Research

# Intrinsic Raw Materials Value in Stainless Prices



# Changing Stainless Market Leadership...




## ... Changing (Raw Material) Strategies

| Region | Scrap Availability | Scrap Input Ratio | Scrap Trade | Interest in Primary Metals |
|---|---|---|---|---|
| United States | High | High | Exports | Very low |
| Japan | Sufficient | Medium | Exports | Backward integrated |
| EU | High | Above average | Large Exports | Minimal |
| China | Low | Low | High Imports | Continuing Investments in Cr & Ni |

# Conclusion

StSt

The entrance of China into the **Stainless Steel** Cluster has made market conditions significantly more volatile.

Global stainless market growth slowed down during the past decade as compared with the 1980s and 1990s. Lack of transparency and high volatility have a negative impact on stainless demand.

Cr

The **Chrome** supply will be exposed to power supply restrictions and lack of investment into large operations. Supply bottlenecks over the next few years cannot be excluded; and in the light of above average rising demand higher prices are likely.

Ni

Substantial new capacities are underway, which guarantee sufficient **Nickel** supply in forthcoming years. At the same time, availability of stainless scrap continues growing and production of Nickel Pig Iron in China is the “wild card”.

# Contact Details


**Heinz H. Pariser**

Heinz H. Pariser
Alloy Metals & Steel Market Research
Scharnstr. 51
46509 Xanten

Germany

Tel.: +49 2801 77 11 0
Email: info@heinzpariser.de

**You are always welcome to contact us.**