



Ferroalloys and ferrochrome market: transforming today from past to future

Dmitry Pastour, CEO



UNICHROME AG

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Industry data is sourced from ICDA, FerroalloyNet, LME, MB, ISSF, OANDA (2019).



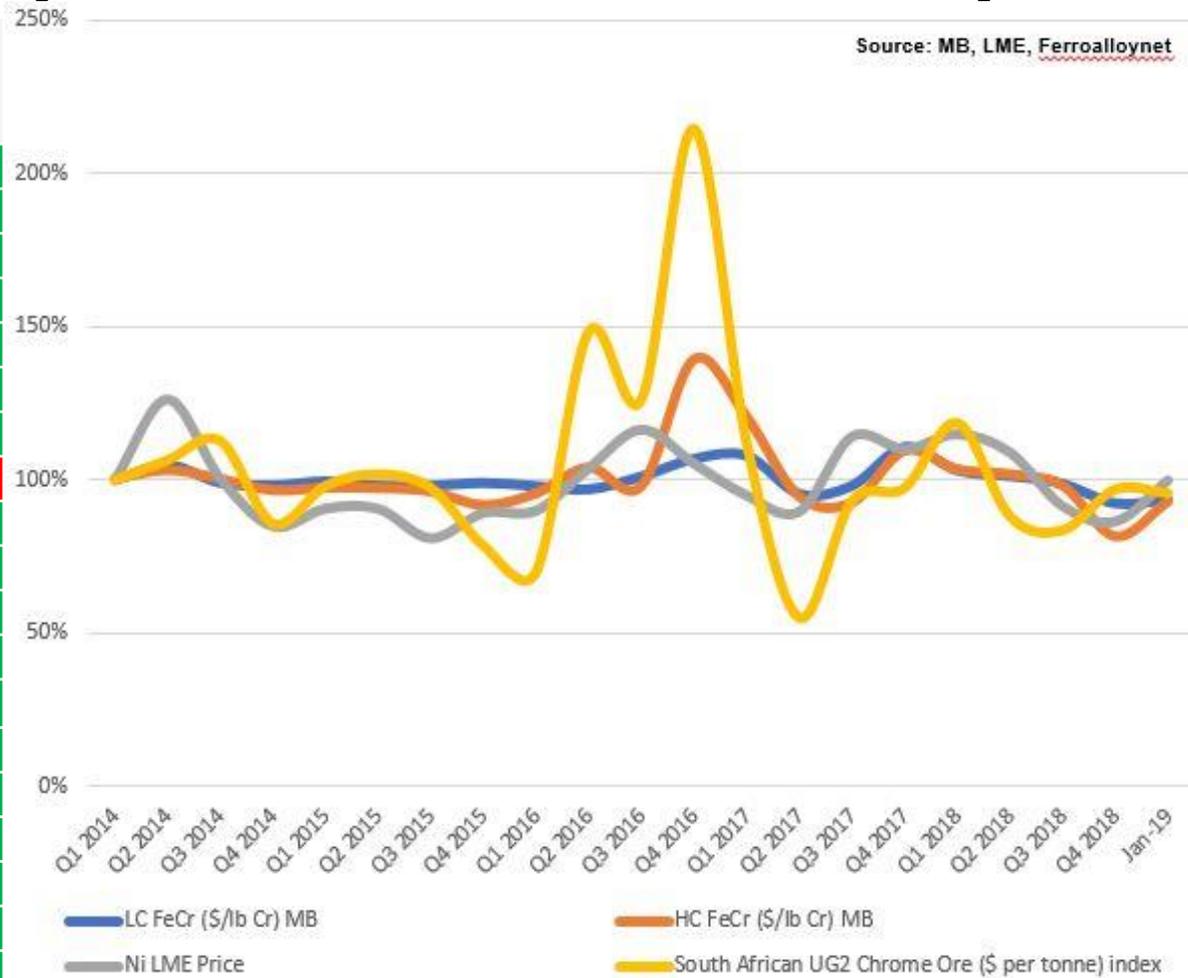


Market Overview



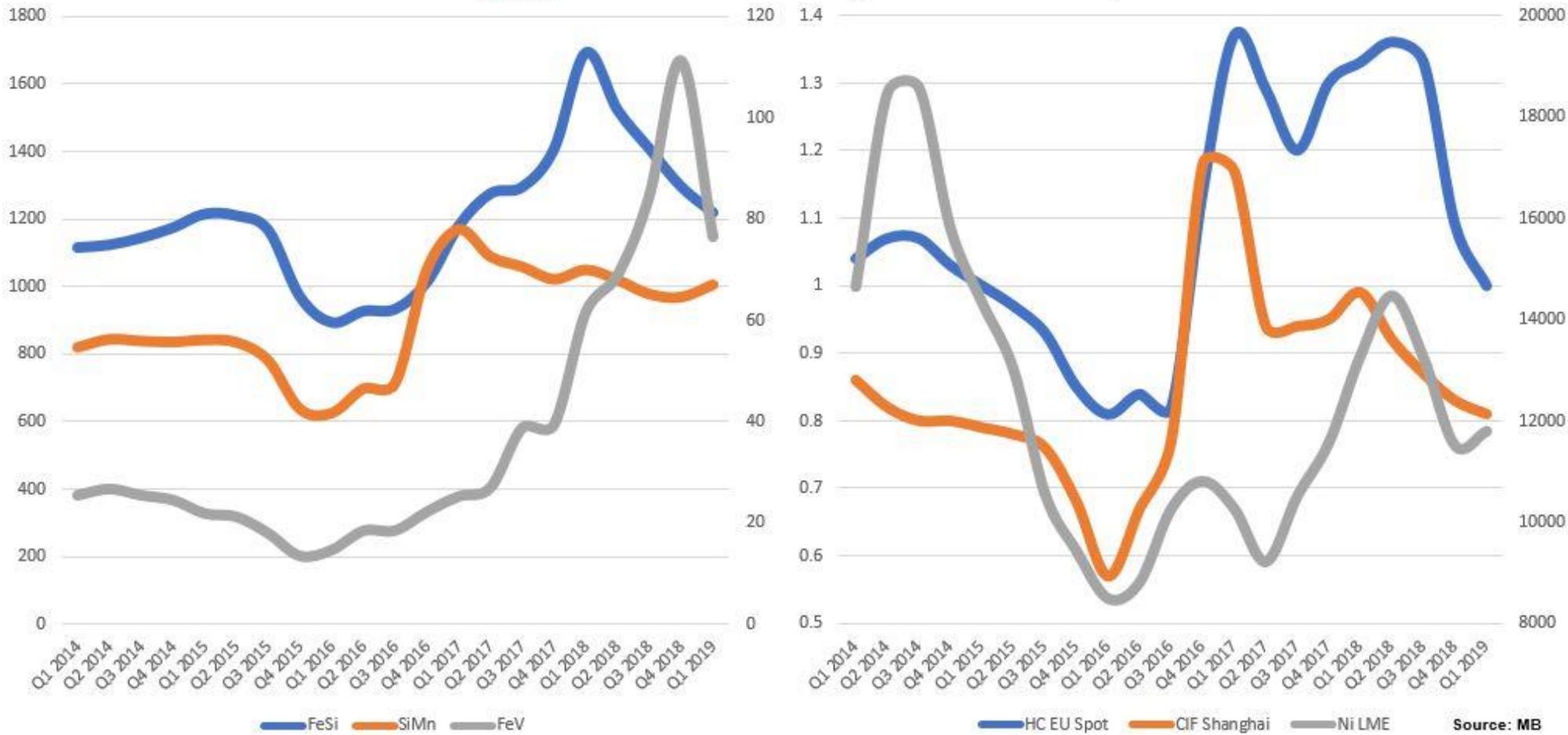
Chrome, ferrochrome, ferroalloys and other commodities market volatility

	2019 YTD	Dec 2017 vs Dec 2018	Dec 2015 vs Dec 2018
Iron ore 62% CFR China	24%	-3%	75%
Nickel LME	24%	-14%	22%
Crude oil Brent	18%	-20%	44%
Copper LME	12%	1%	52%
Tin LME	12%	-2%	34%
Zink LME	11%	-24%	57%
FeV Europe	10%	61%	424%
Platinum	6%	-14%	-10%
Gold	3%	-4%	22%
HC FeCr EU MB	3%	-21%	23%
Aluminium LME	2%	-17%	24%
SiMn MB	1%	-2%	70%
Average China Tender FeCr	1%	-2%	25%
CIF Shanghai ChCr	0%	-10%	27%
LC FeCr MB	0%	-10%	5%
UG2 CIF China	-1%	-25%	42%
FeSi MB	-6%	-22%	42%
EU Benchmark ChCr	-10%	-11%	19%
Cobalt LME	-20%	-26%	131%





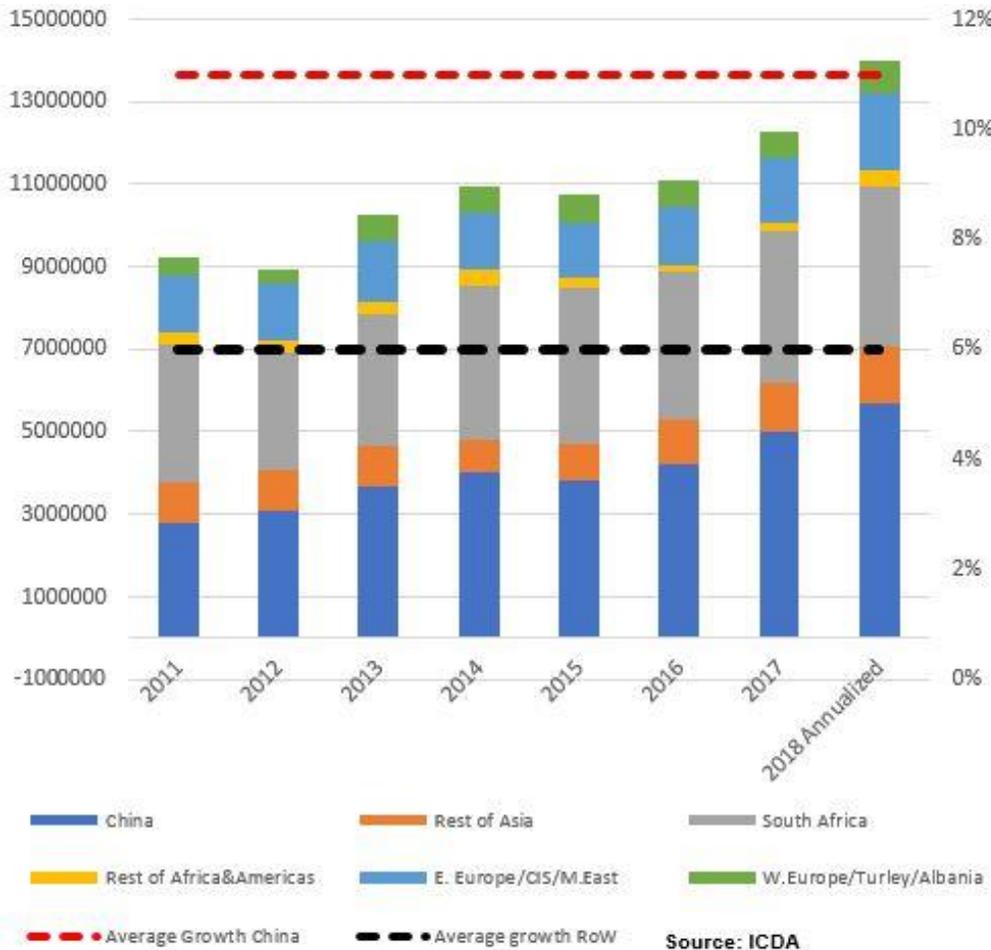
HC FeCr and Ch Cr Price history vs other ferroalloys



Source: MB



FeCr Production



- FeCr production in China rose on average by 11% since 2011
- FeCr production in RoW rose on average by 6% since 2011

Kazakhstan

- After completion of the new meltshop in Aksu, no new expansion projects have been announced. Increase in capacity utilization and production

South Africa

- In August of 2018, China announced a major investment in South Africa. This investment will consist of a metallurgical complex and will incorporate: a stainless-steel plant (capacity 3 million tons per year), ferrochrome plant (capacity 3 million tons per year) and silicomanganese plant (capacity 0.5 million tons per year). The total value of the project is over 10 billion USD. Since then no additional information has been released
- Glencore/Merafe increase production to higher capacity utilizations
- Samancor appears to increase capacity utilization and production, including newly acquired assets
- No news regarding production at Richards Bay (Traxys)
- ESKOM expecting to hike the electricity tariffs and continue load shedding

China

- 2018 capacity increase of 600,000 tonnes. Total output increased by 6.8% to 5.27 million tonnes. Expected output increase for 2019 at 5% to 5.53 million tonnes

Turkey and Sweden

- Optimize capacity utilization and production.

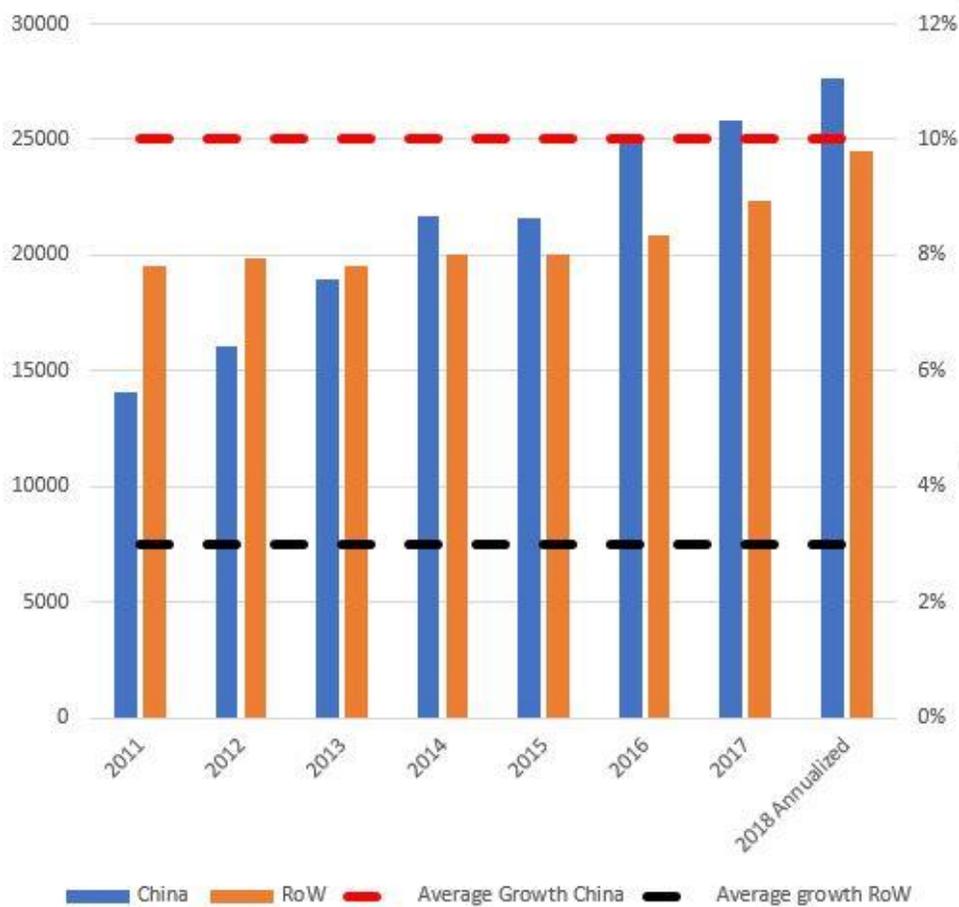
Zimbabwe

- According to press releases ERG negotiating projects that will cover chrome extraction and construction of a ferro-alloy facility in the country



Stainless Steel Production (in '000 mt)

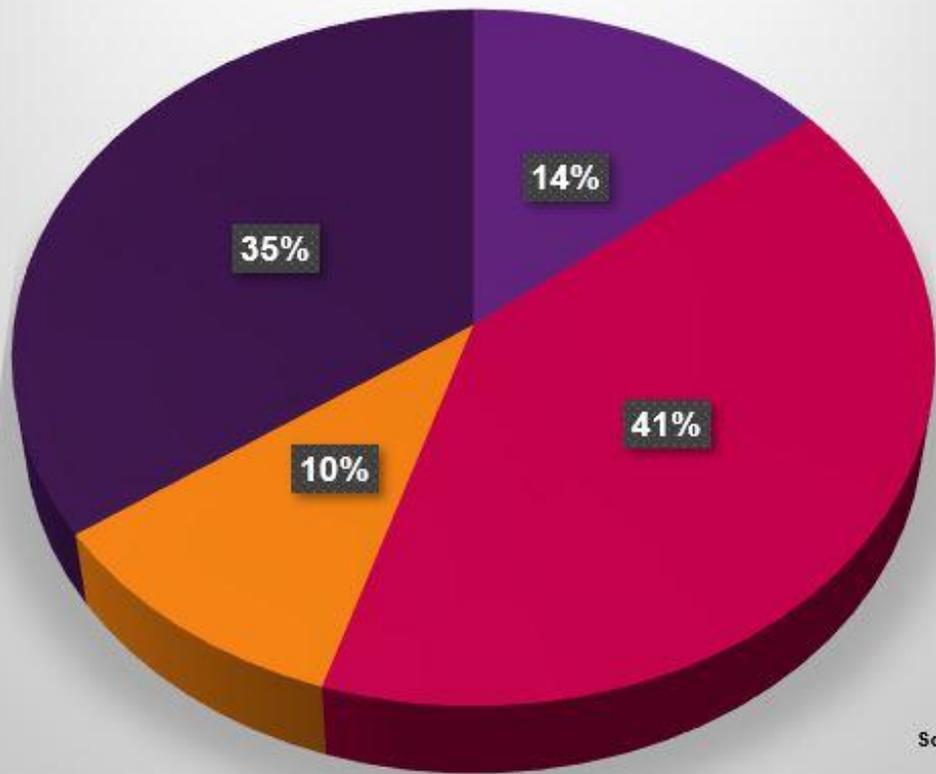
Source: ISSF



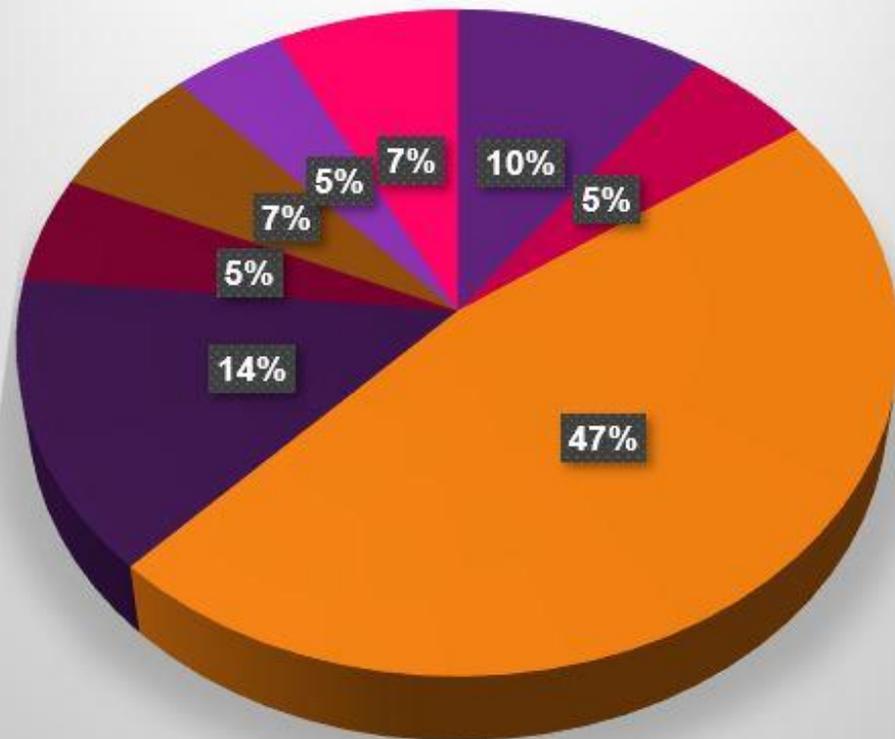
- Stainless steel production increase from 2017 to 2018 by 3,4 million tonnes, or 6.8%
- Indonesia accounted for 2,2 million tonnes or roughly $\frac{3}{4}$ of total increase
- Indonesia production figures: 680,000 tonnes in 2017 to 2,860,000 tonnes in 2018 (an increase of 320%), with 2019 production forecasted at 3,550,000 tonnes (an increase of 25%)
- Despite such huge numbers, that production might have little impact on the ferrochrome, since technologically the production is designed for use of inhouse liquid ferrochrome and will only purchase chrome ore.
- However Indonesian stainless steel industry still has to overcome certain challenges:
 - Financing is running out
 - Environmental issues become more public
 - Cost increases might offset the advantage of Indonesian projects
 - India in considering implementing import duties on the steel produced in Indonesia, since imports increased 9 times and most of the production belongs to Chinese companies



HC FeCr production 2018 by type



HC FeCr consumption 2018 annualized



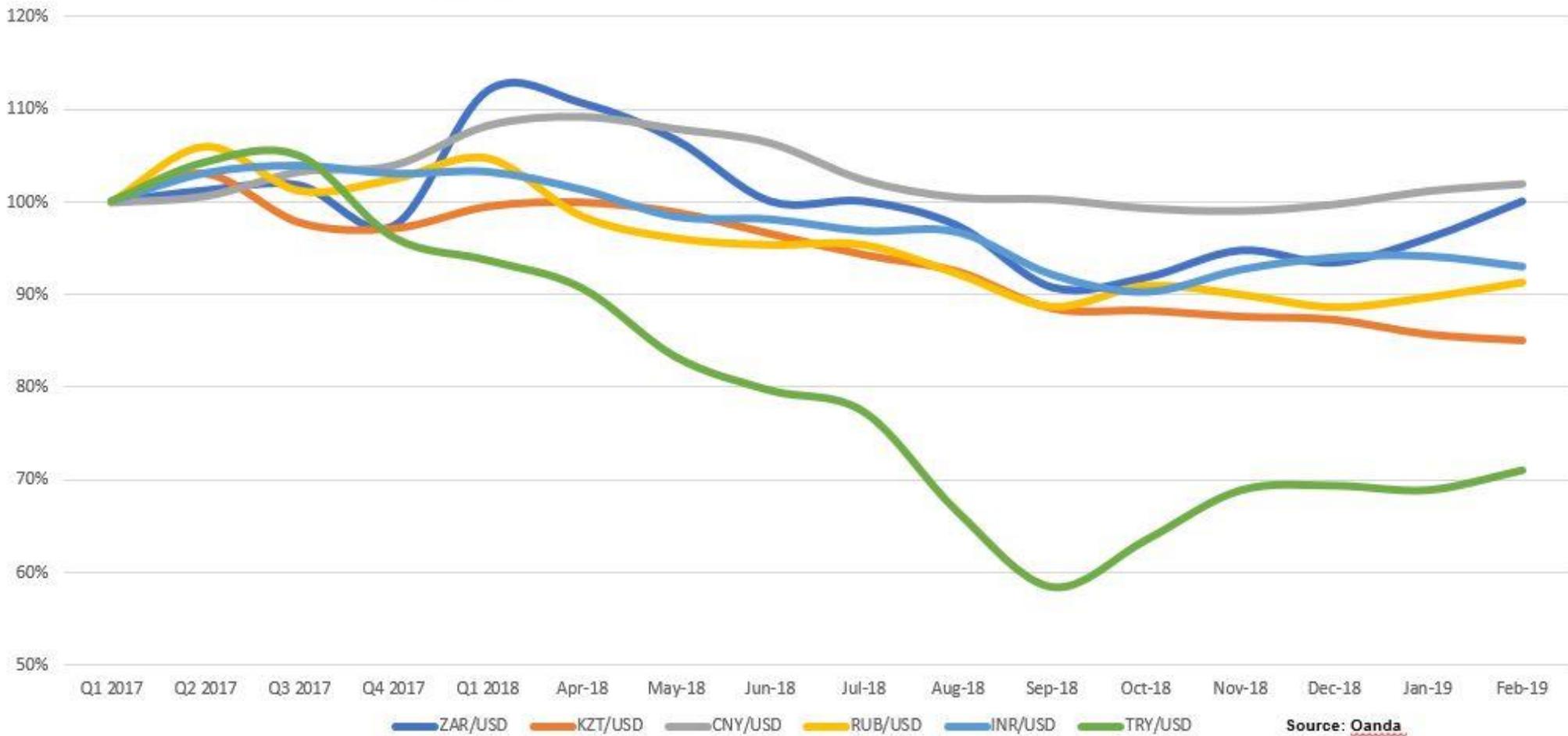
Source: ICDA

■ High Grade HC FeCr ■ Low Grade HC FeCr China
■ Low Grade HC FeCr RoW ■ Ch Cr

■ Europe ■ USA ■ China Production
■ China Imports ■ India ■ Japan
■ Korea ■ RoW



FeCr producing countries currencies exchange rate





Market Trends

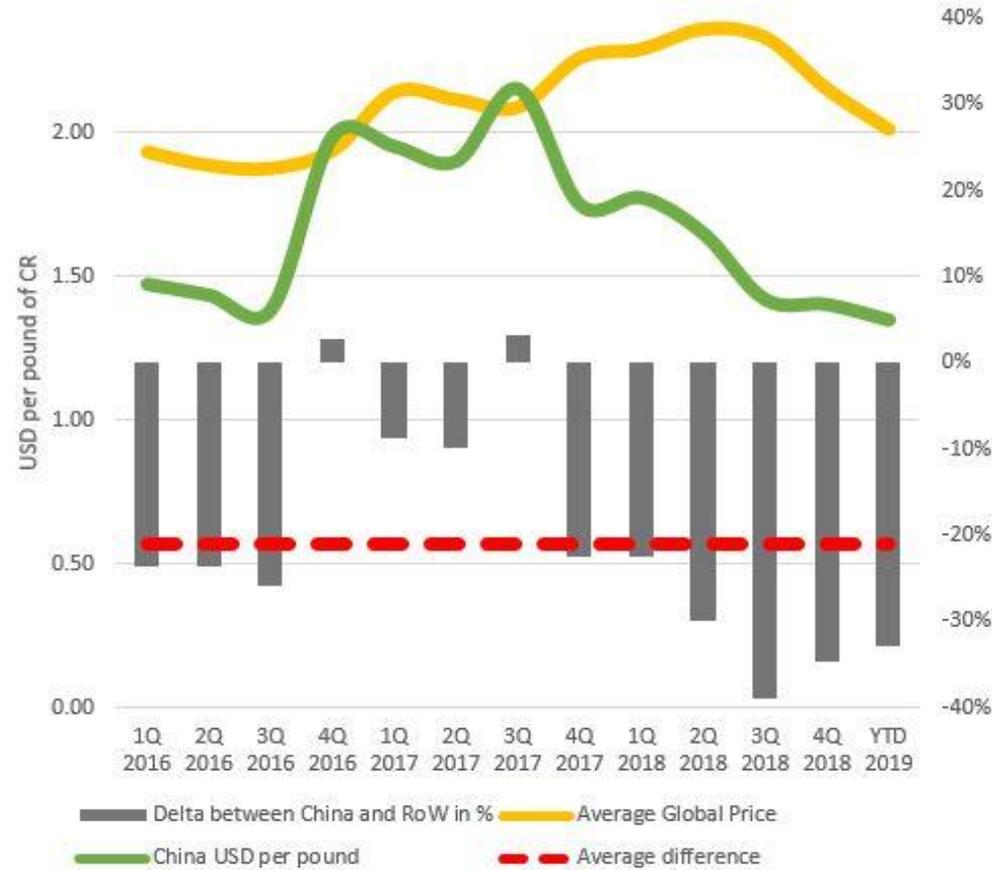
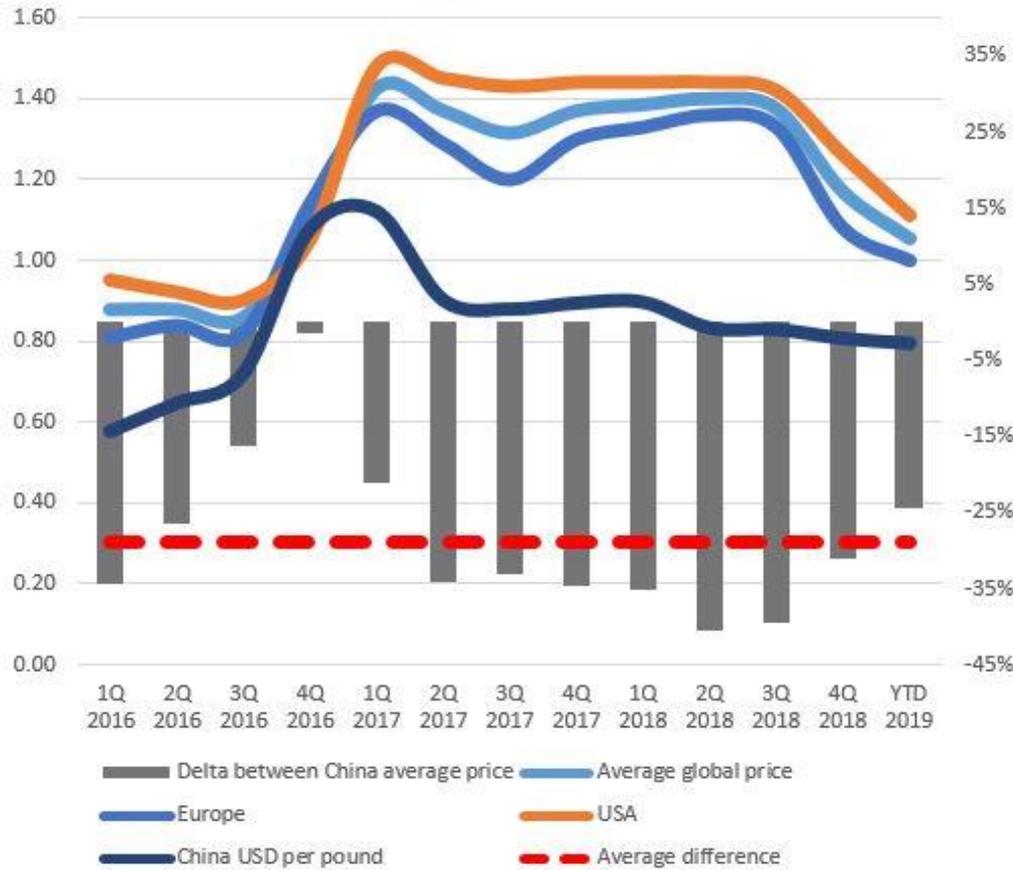


Global FeCr prices vs China domestic FeCr prices

Source: MB, Ferroalloy.net

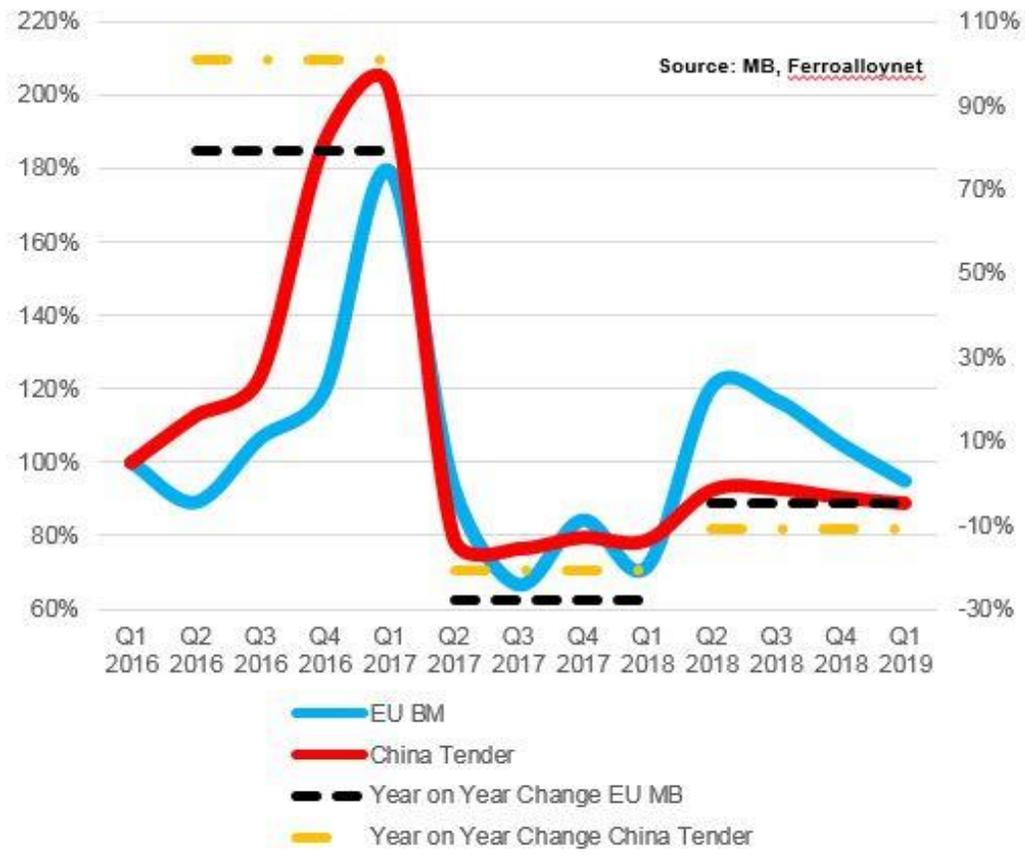
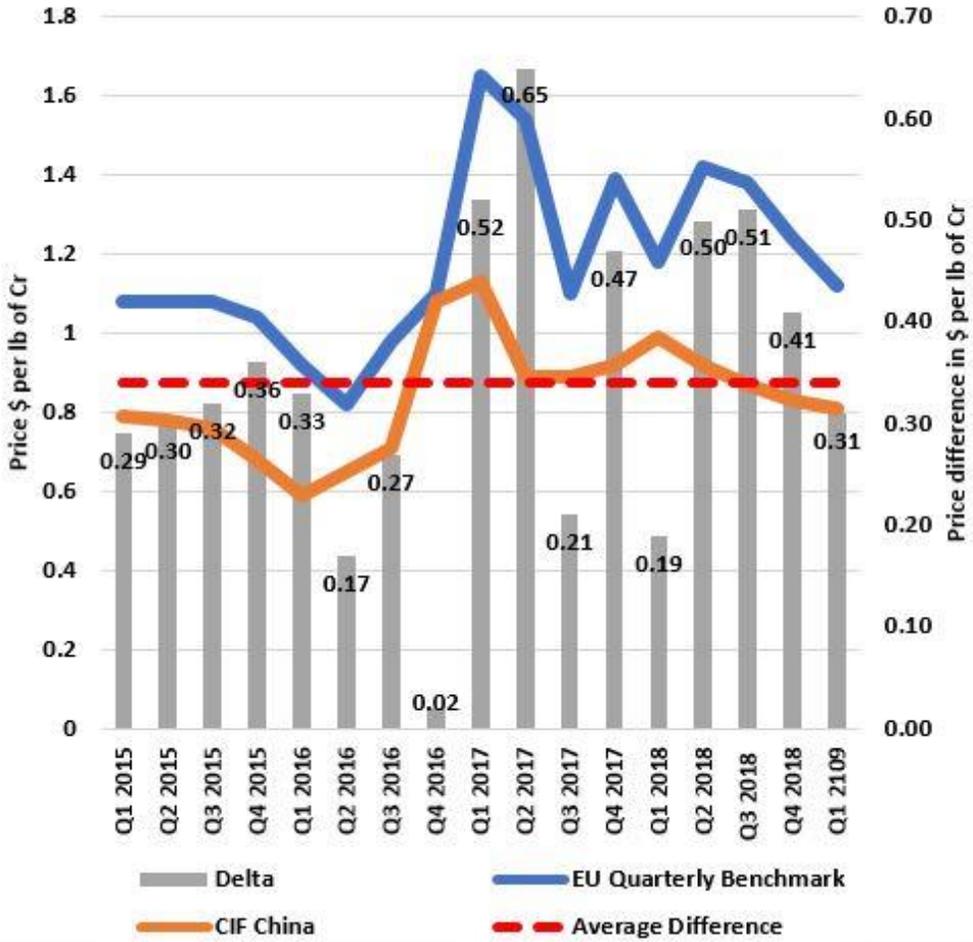
HC FeCr Global Prices

LC/MC FeCr Global Prices



Chromium
51.99%

EU Benchmark vs CIF China South African HC FeCr



Q1 2016 to Q1 2017: EU Benchmark growth of 79%, China Tender growth of 101%
 Q1 2017 to Q1 2018: EU Benchmark decrease of 28%, China Tender decrease of 21%
 Q1 2018 to Q1 2019: EU Benchmark decrease of 5%, China Tender decrease of 11%
 Q1 2016 to Q1 2019: EU Benchmark growth of 22%, China Tender growth of 42%





HC FeCr vs Ch Cr vs China domestic Price

- Over past several years, many commodity markets have shown volatile behavior. Cr ore and FeCr indexes were within the top of most volatile indicators for the metals and commodities in general.
- Historically, the Ch Cr Benchmark was the leading index to reflect the market of FeCr not only in EU but also globally.
- Bidding prices announced by consumers in China is getting more and more relevance for the market worldwide.
- Ten or more years ago, FeCr in China was following a mature markets trend. After 2008 shock it has started to show its own dynamic led by domestic supply/demand rather than the worldwide market. Since 2015 one could see more and more correlation between benchmark moves and a pattern of indexes and tender results in China with one quarter time lag.
- European HC FeCr market is driven by its own supply/demand on higher Cr-content FeCr, and only follows ChCr in general direction.
- Several indexes were developed on a basis of spot prices in different regions, but those indexes cover only a small portion of the market (roughly 5%).
- During past years HC FeCr maintained certain premium to ChCr.
- Currently, premiums for HC FeCr in Europe are going down due to introduction of technologies that are less dependent on the higher Cr content usage.
- Additionally, more and more suppliers are targeting premium markets like Europe and USA, thus driving the prices down.





Pricing methodologies and their drawbacks

- European HC FeCr market is driven by its own supply/demand on higher Cr-content FeCr.
 - The European Benchmark is a ChCr index, however it still has application in HC FeCr market.
 - It is settled between one of the largest ferrochrome producer and one of the major stainless steel producers.
- Market in China is highly driven by domestic ferrochrome producer's cost of production. Recently one could see that as soon as domestic prices in China drop below 7000 RMB/t, the availability of FeCr also goes down, because of the temporary production cuts, due to higher cost of production:
 - Over the last couple of years the bidding price was settled below that point for short periods of time.
 - Settled between producers and consumer and then publicly announced. Details, number of suppliers and volumes often are not disclosed. It is largely depends on local production-cost and raw material availability
- Regional indexes, reported by analytical agencies and based on the spot pricing, despite reporting the market transactions, they account for only 5% of the global trade and thus are not representative of the market.
- Over the years ferrochrome industry has been plagued by its pricing mechanisms, which are not liquid and don't have enough credibility to become one leading price indicator.
- So far new digital technologies have very little penetration into ferroalloys trading market. With the current technology it is possible to create trading platform that will provide market place for liquid trading with financial responsibility and price discovery transparency.
- Such platform might also be a good risk management and hedging tool.



New digital projects and way forward

Type of Platform	Counterparty search/Negotiation	Delivery Terms Variety	Delivery Execution Control	Additional Liquidity Financing Potential	Price Discovery
• Deal/Counterparty search platform	Yes	High	Offline	Offline	Offline
• Performance/Trade finance facilitation	Offline	High	Yes	Yes	Offline
• Supply Chain/ Transparency Control	Offline	High	Yes	Offline	Offline
• Trading Platform with Guaranteed Liquidity and Performance	Yes	Low	Yes	Yes	Yes





Ferrochrome industries challenges

Since beginning of 2019, there were certain general economical upsides which have supported commodities market and improved general outlook for 2019 for many metals, including ferroalloys:

- China/ USA trade war risks are moderating
- On the other hand, there are concerns about global economic slowdown or even recession in some regions
- Signs of moderation of quantitative tightening in USA and potential easing in EU
- Massive quantitative easing in China.

On the other hand, ferrochrome industry faces other risks that will affect it, such as:

- No increase in new capacity ex-China
- Slowing of demand growth for virgin FeCr units from big share of new stainless steel capacity (Indonesia)
- The price gap between regions was widening until mid-2018, increasing volatility and creating a huge drop from prices ex-China
- Worldwide usage of Bidding Prices in China as reference could create difficulties for both suppliers and consumers, since the rest of the world will be exposed to China domestic FeCr market pricing, which is influenced by some country specific factors:
 - Domestic prices are in RMB, this will expose non-China buyers to RMB/USD exchange rate
 - China export restrictions: export duty and nonrefundable VAT
 - Dependence on the imported Cr ore market, rather than on worldwide ferrochrome supply/demand balance
 - Exposure to China domestic environmental shutdown policies affecting supply/demand

The ferrochrome market requires the mechanism which will allow all market participants to measure future expectations on a longer term, with more accuracy and financial responsibility than what exists now. Digital platforms for physical metal with liquid pricing will be able to provide it.





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