



Developments in the silicon metal market

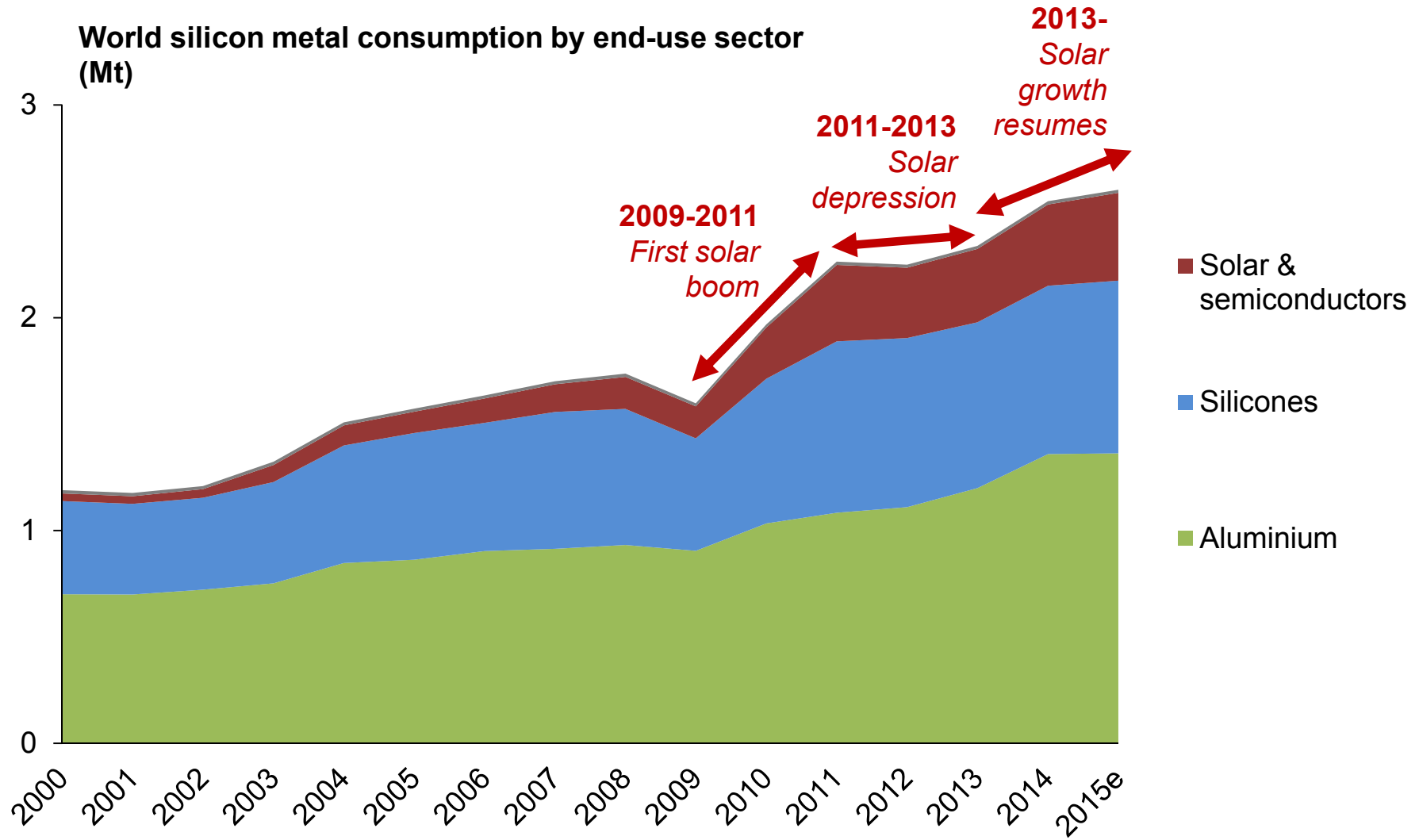
Kevin Fowkes
Managing Consultant

Argus European Light Metals Conference
Dusseldorf, 4th November 2015

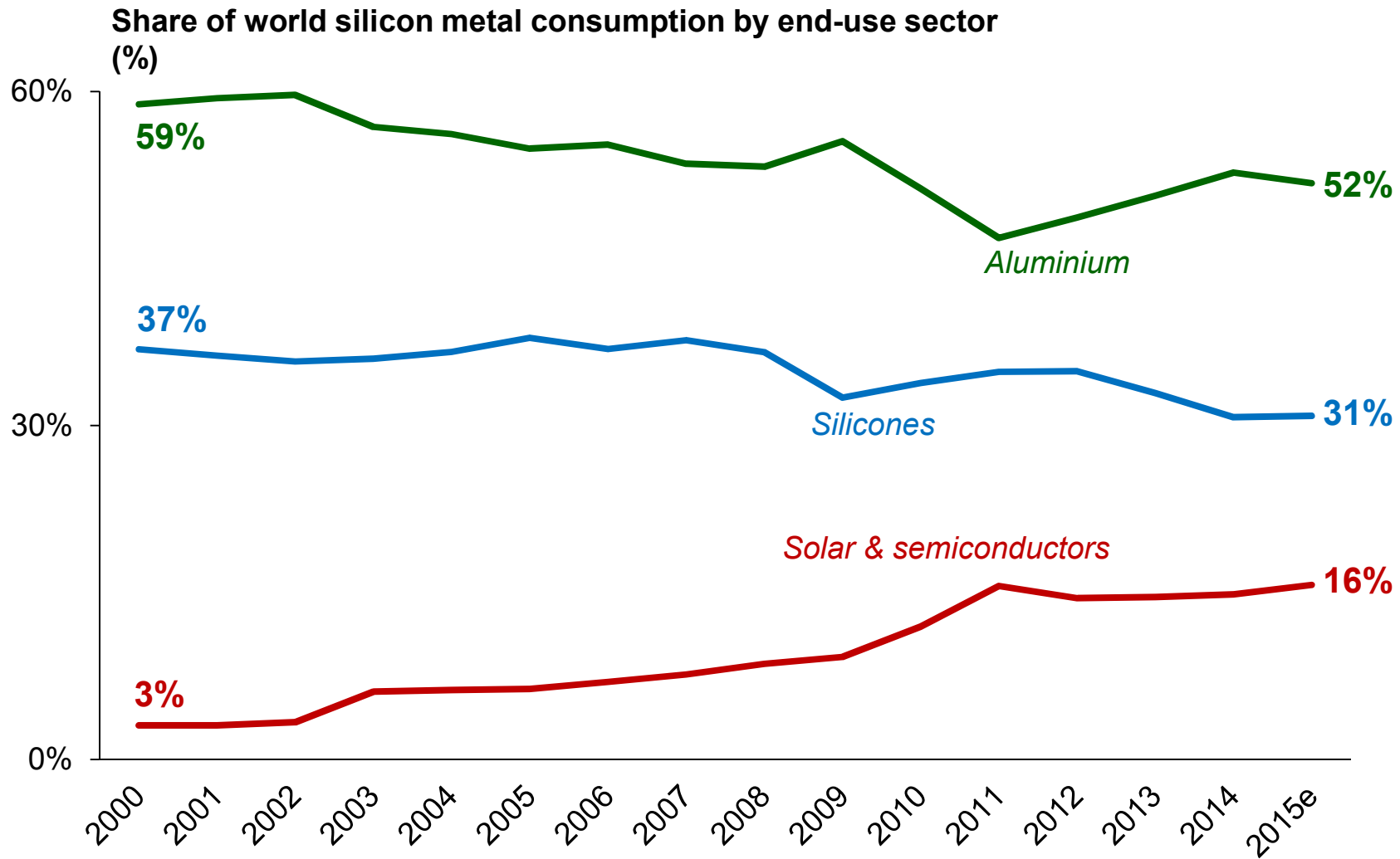


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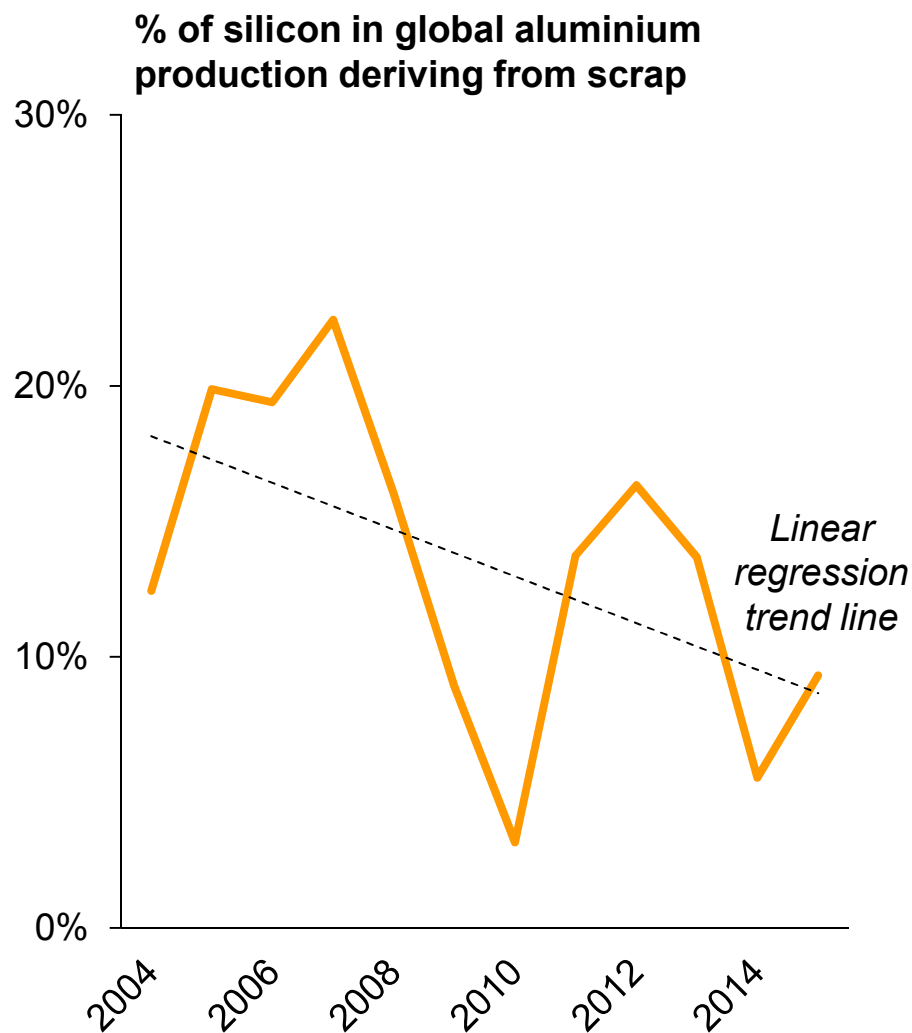
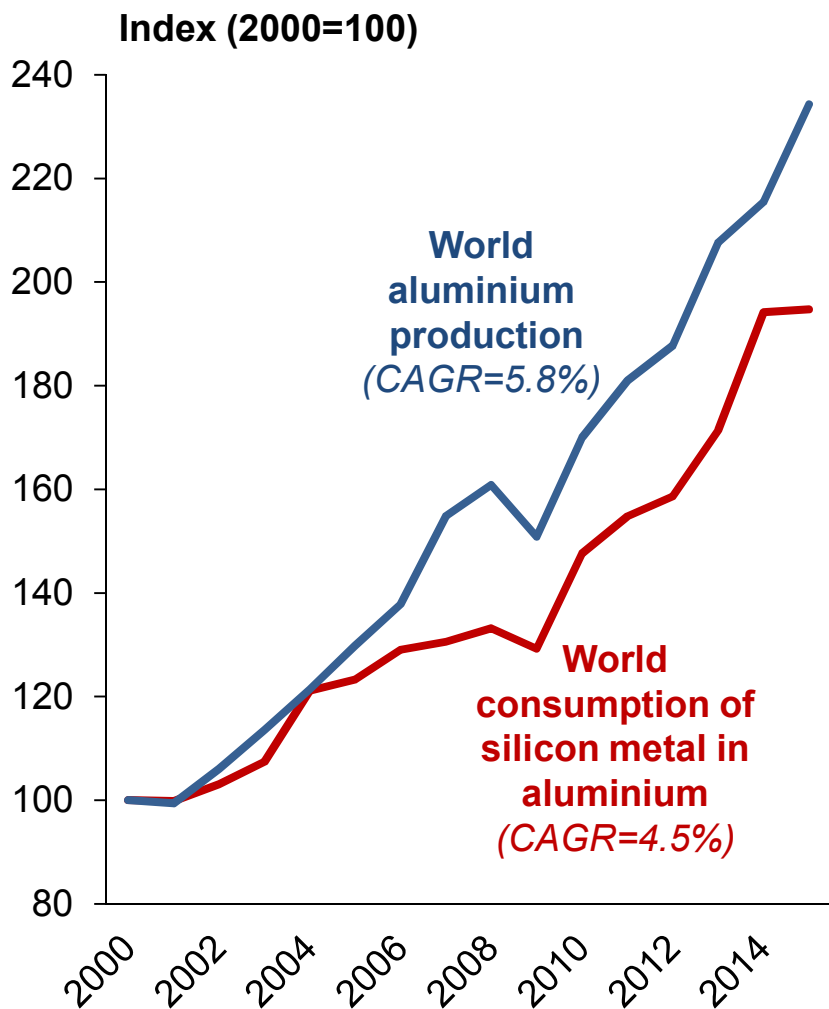
The ups and downs of the solar industry have driven silicon metal demand trends since 2009 – solar is in a strong growth phase once more



Though the growth of solar has been the big story of the past 10 years, aluminium and silicones remain the largest end-uses for silicon metal

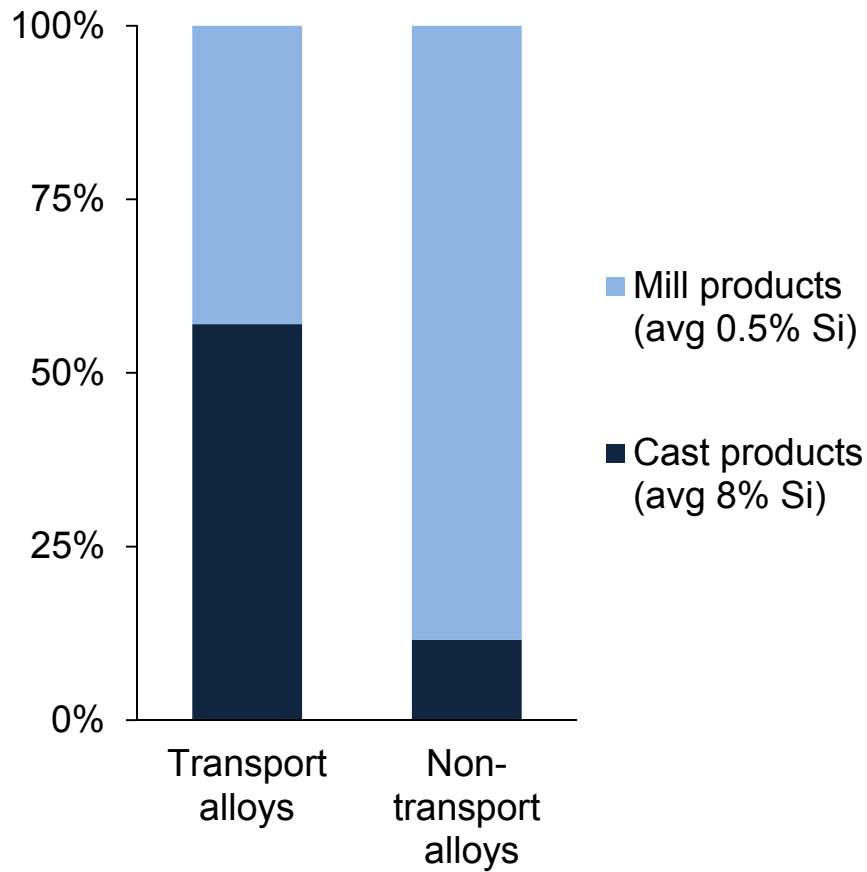


Aluminium production has outpaced silicon metal consumption in aluminium – despite a declining silicon scrap usage rate

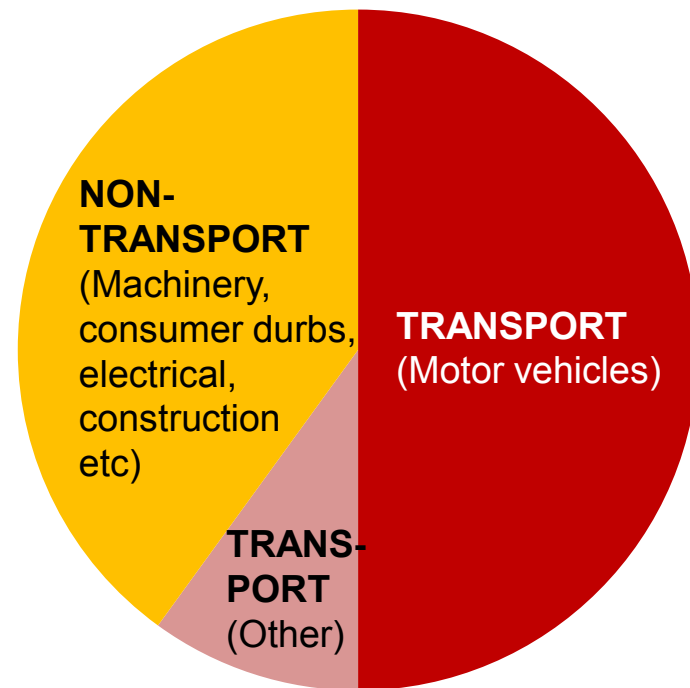


The transport sector accounts for about 60% of the silicon metal used in aluminium

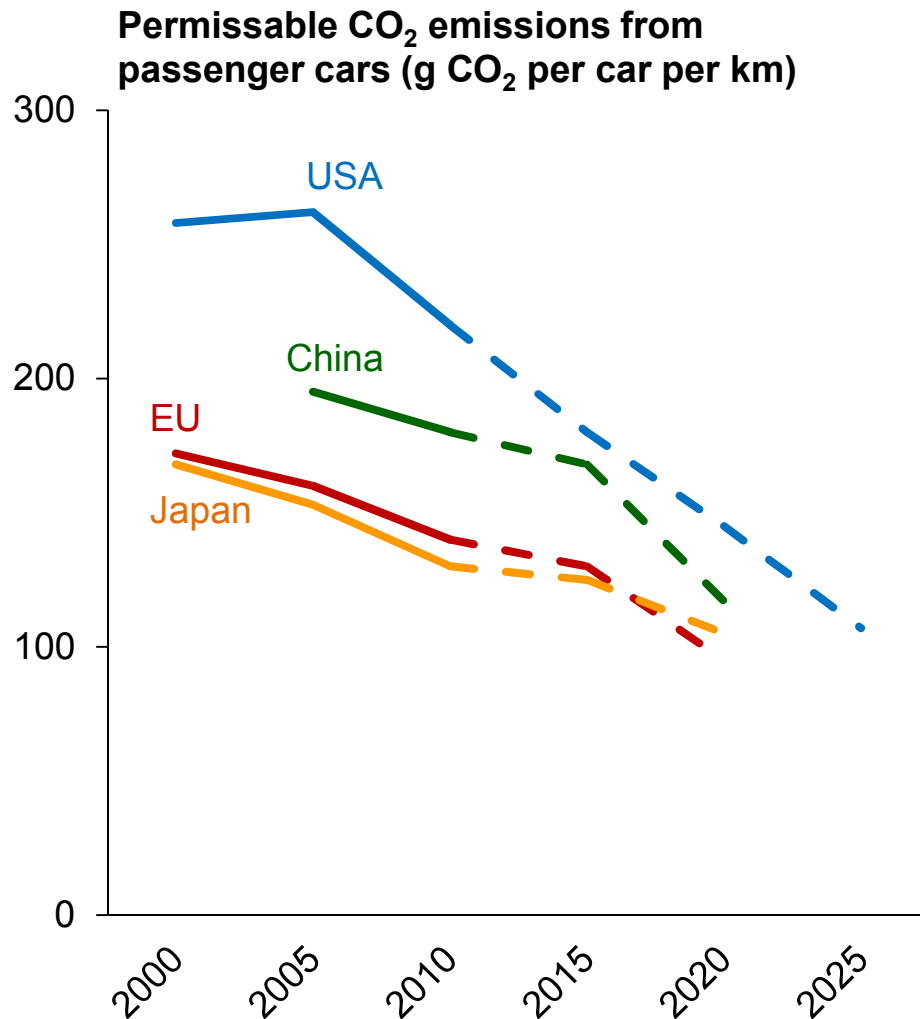
Division of aluminium alloys by sector and type



Silicon metal used in aluminium by estimated end-use

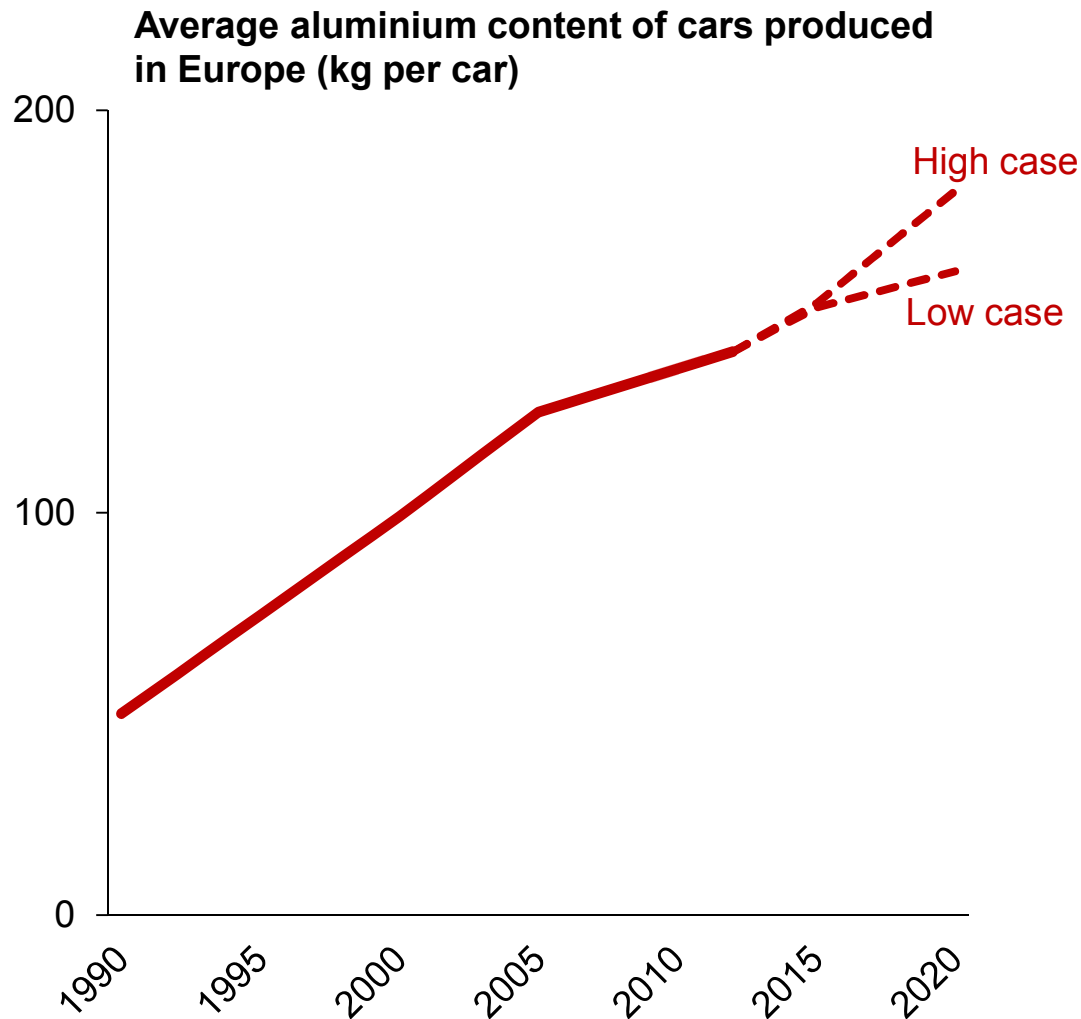


Permissible CO₂ emissions from vehicles will decline substantially in the next 10 years, especially in regions where limits are less strict at present



- The EU and Japan have so far led the world in terms of automotive fuel efficiency / CO₂ emission standards
- Over the next 10 years, standards in China and the USA will become much more strict, and will close the gap with the EU and Japan
- Lower CO₂ emissions requires greater fuel efficiency, which requires a lighter automobile
- Other pressures on automakers add weight to cars – eg. greater crash resistance & better specification
- Using lighter materials with same strength is the best solution (good for aluminium, bad for iron & mild carbon steels)

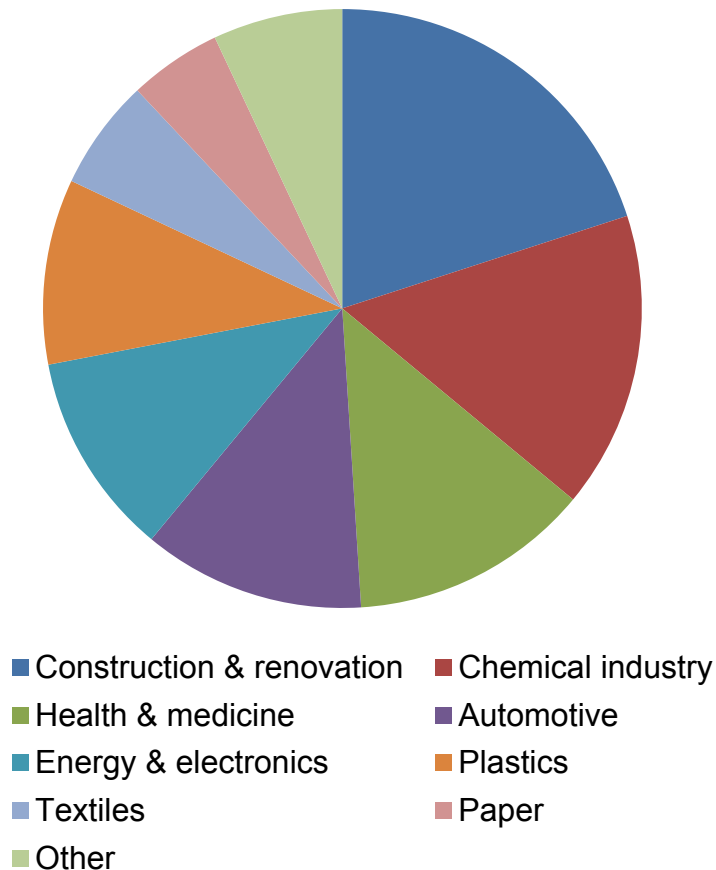
The average aluminium content of a European car has nearly tripled since 1990, and will rise by a further 15-30% by 2020



- Aluminium's superior strength-to-weight ratio makes it more effective for building fuel-efficient cars than steel or iron
- Main disadvantage of aluminium is higher cost – but legislation forces auto makers to act
- Average aluminium content of European-produced cars has nearly tripled since 1990
- There will be a further increase of 15-30% by 2020, and faster increases in other regions
- Automotive-related alloys account for the highest amount of silicon used in aluminium

Silicone consumption is driven by disposable income – significant growth potential exists from developing countries growing their middle class

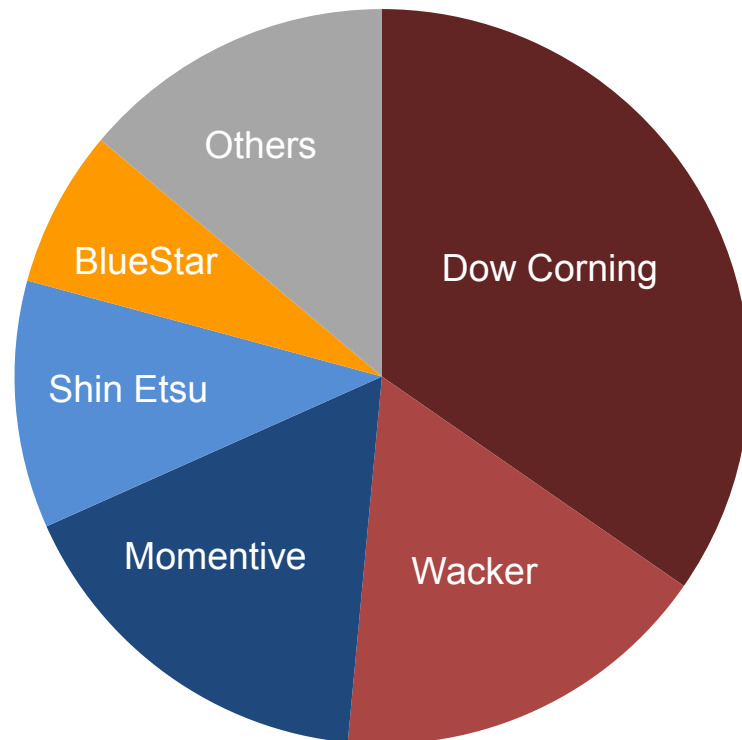
World silicone consumption by end-use (value basis)



- Extremely wide array of consuming sectors; approx 10,000 individual applications – more constantly being developed
- Many are driven by consumer disposable income (eg. beauty, health, home renovation) – most consumption still in west, but substantial growth potential from developing countries building a bigger and richer middle class (especially China)
- Complex upstream & downstream production process – silicon metal most important raw material (approx 0.5kg/t of silicone)

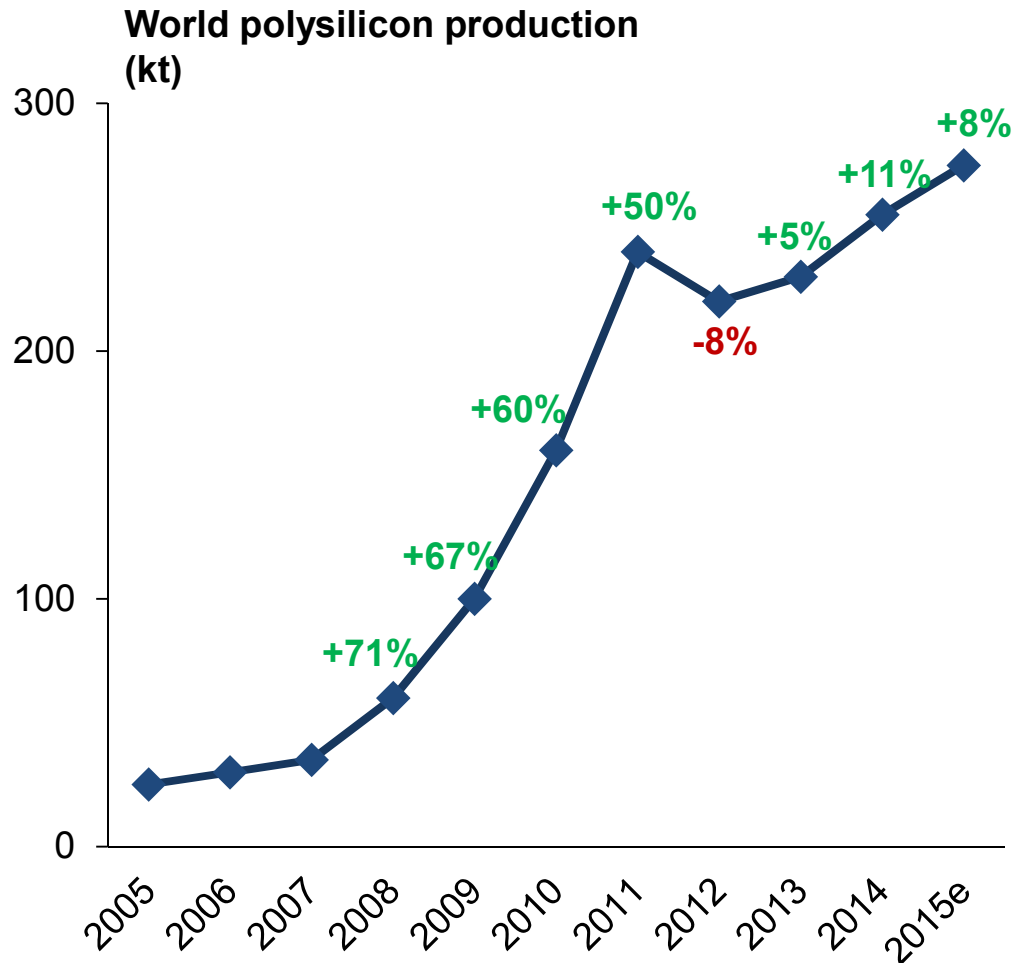
The silicone industry is highly consolidated, with the top 5 producers accounting for approx. 85% of world output

World silicone production by company (value basis)



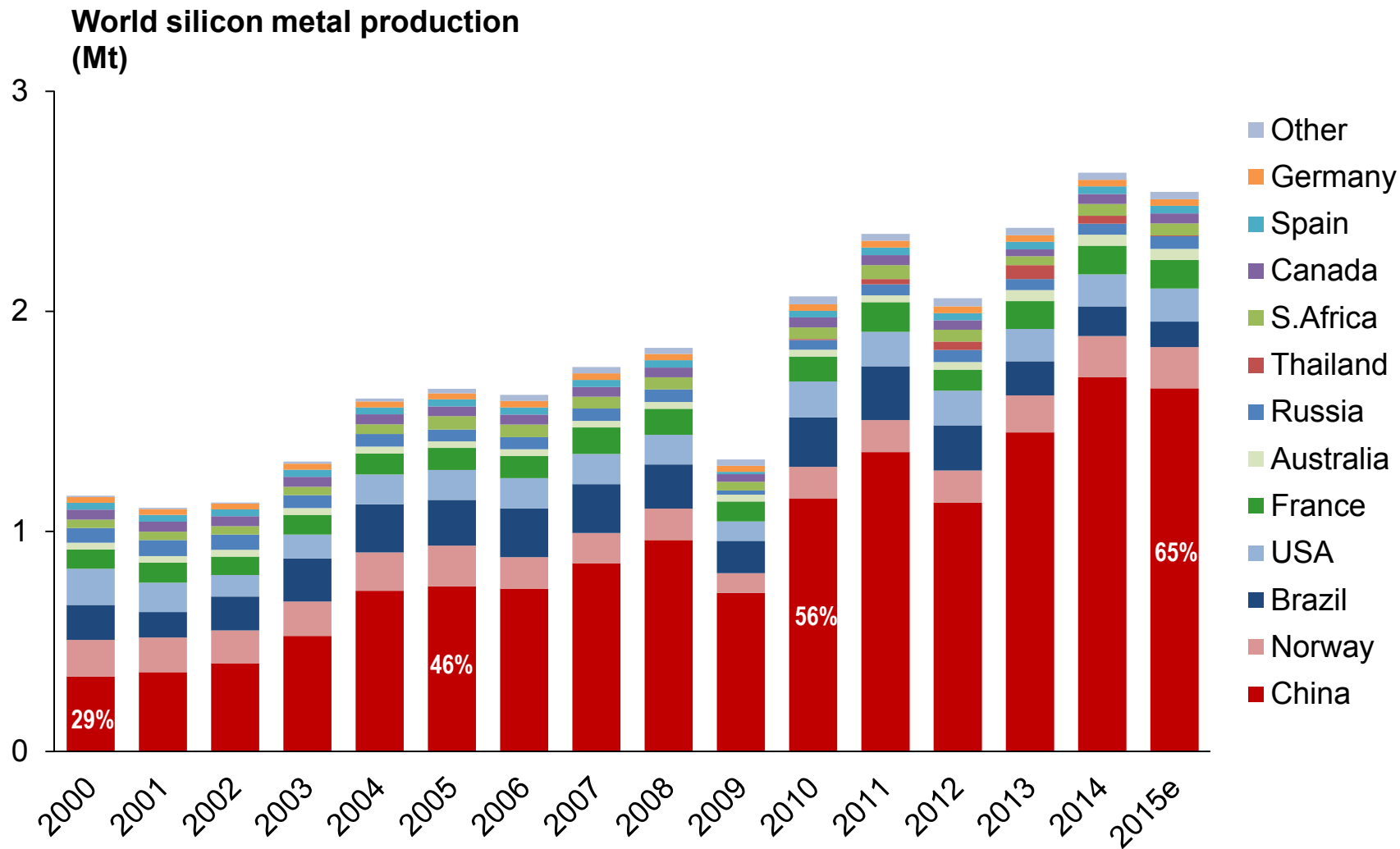
- World silicone production is extremely consolidated – the top 5 producers control approx. 85% of world output
- Until recent years, most upstream capacity was in US, Europe & Japan, with developing world largely served from exports
- Massive investment in integrated silicone plants in China in recent years – much of it JVs with big 5
- Increased efforts to integrate upstream into silicon metal production over past 15 years (DC, Holla, Simcoa, Elkem-BS)

The solar sector now seems to be following a more sustainable growth path, with massive growth potential over the coming decades

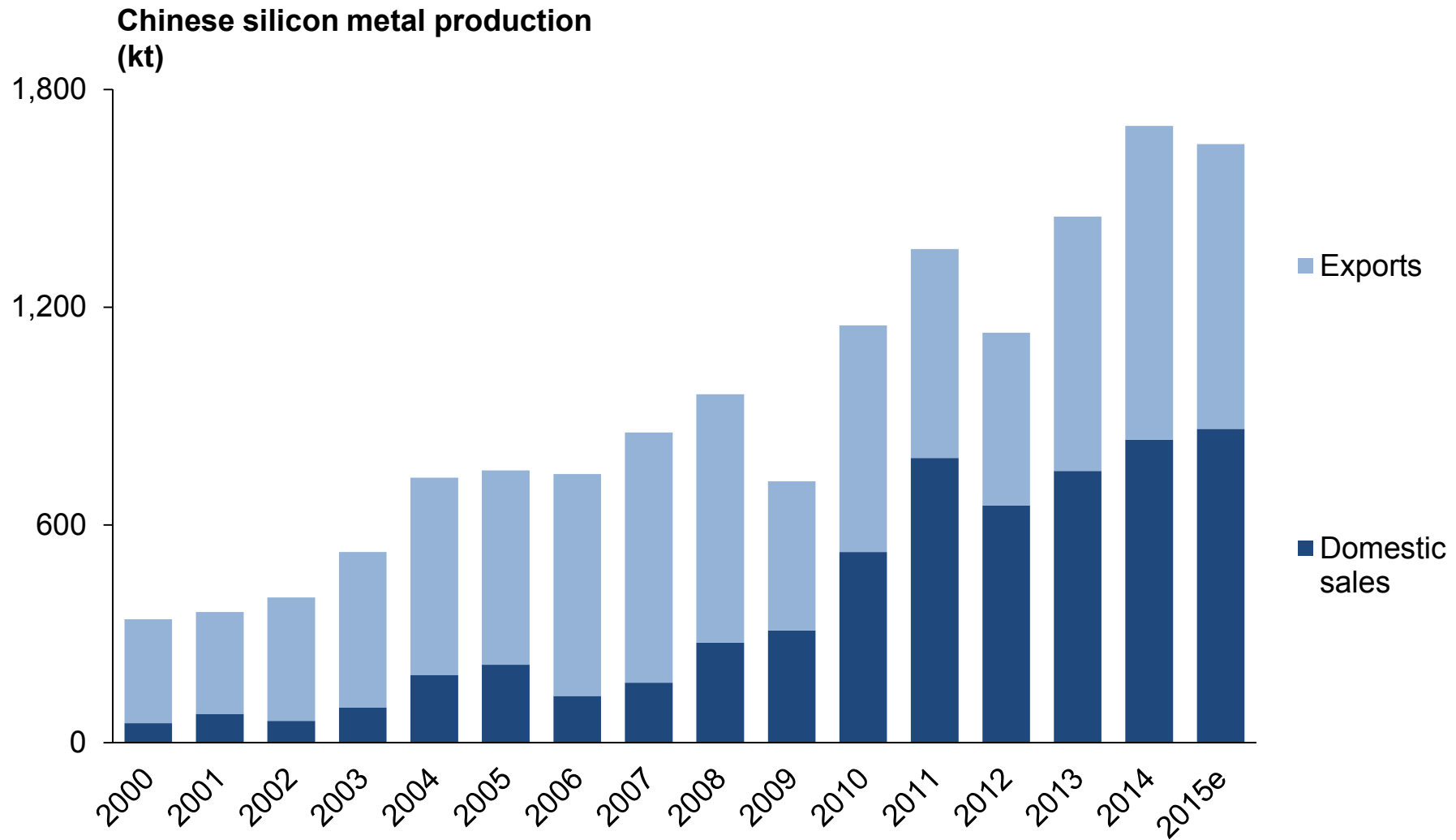


- The solar sector has returned to growth following the “solar depression” of 2011-13
- Growth in demand now more driven by unsubsidised PV installations, mostly in Asia. As such, growth is therefore likely to be more sustainable and less volatile than in the past
- Growth of ~10%pa expected over the long term, requiring hundreds of thousands of tonnes of extra silicon (stark contrast with flat demand outlook for steel)

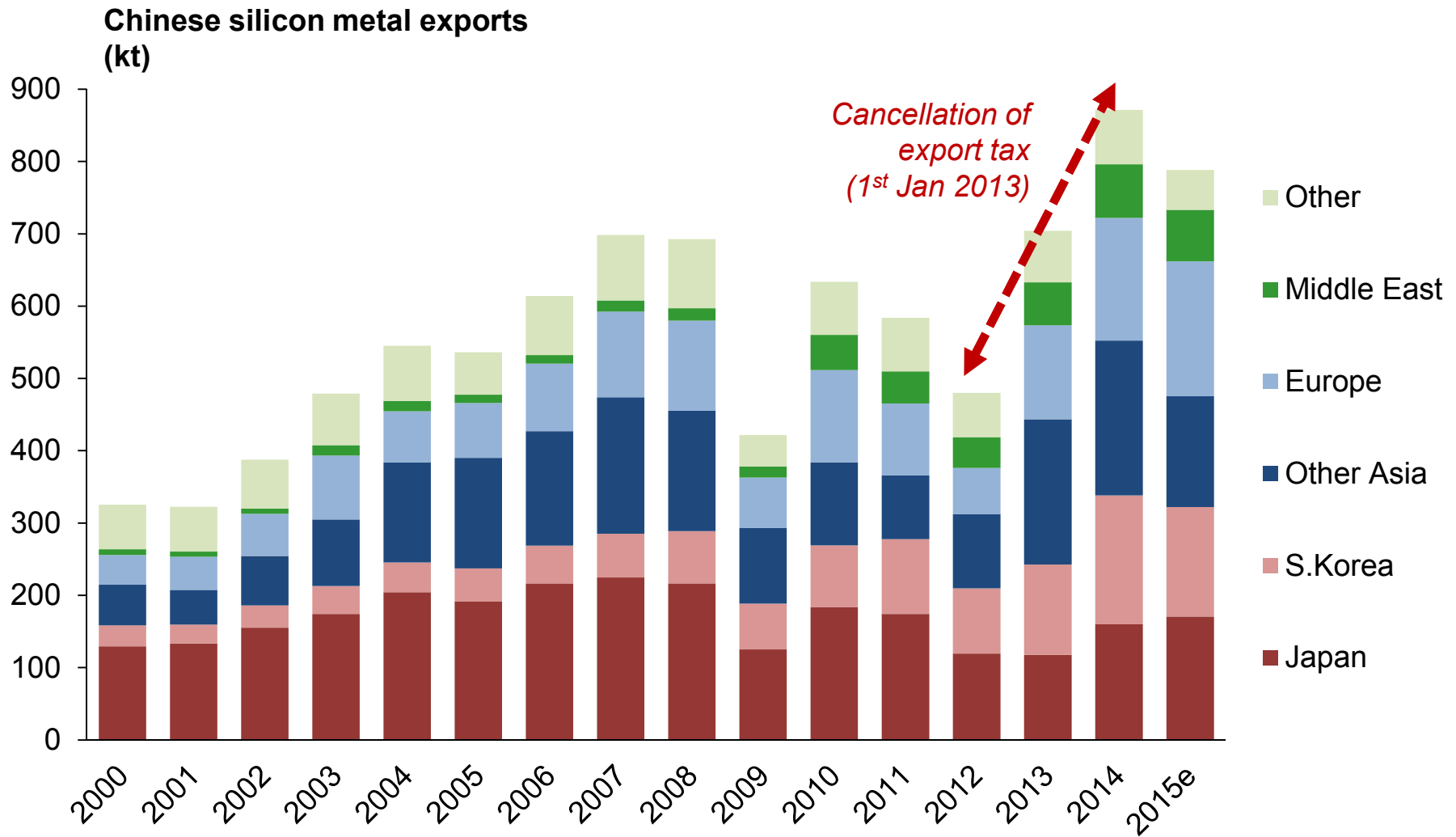
World silicon metal production is expected to decline slightly to reach 2.54 Mt in 2015, with China now accounting for 65% of global output



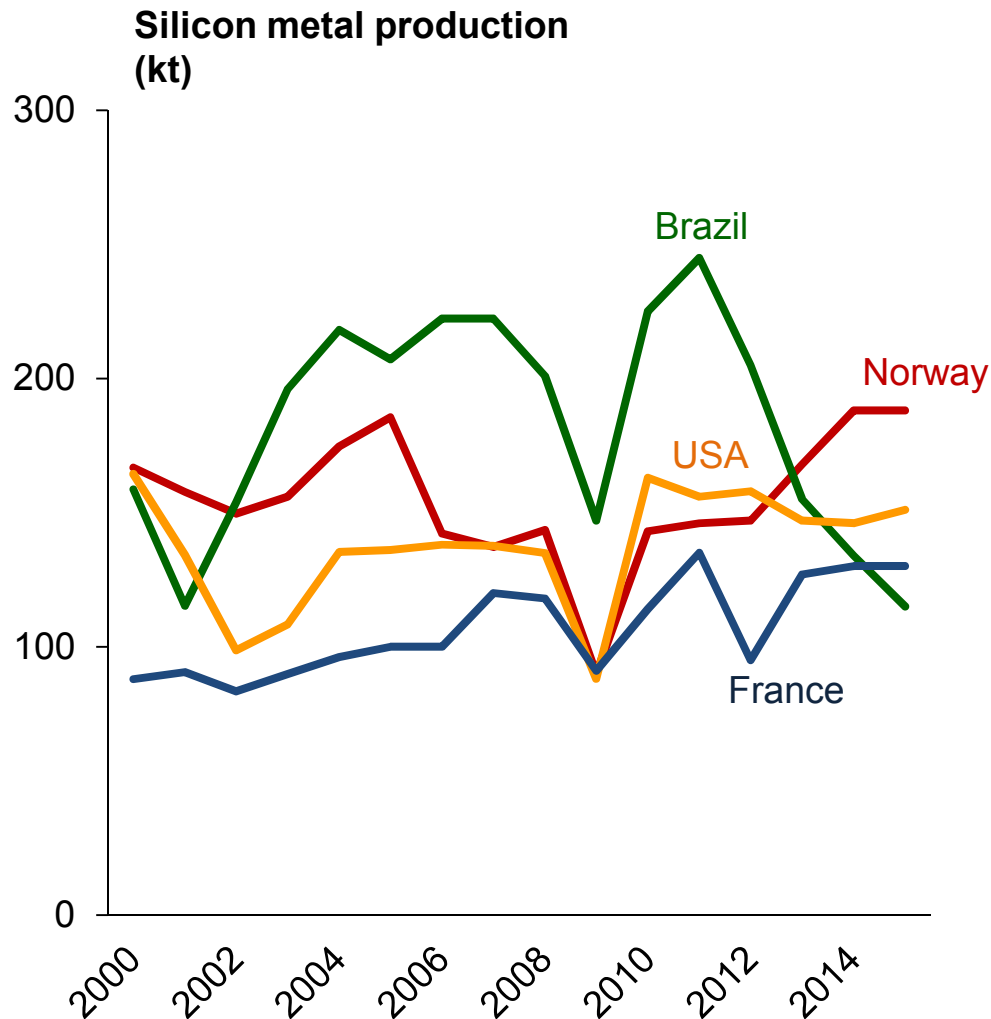
Unlike most ferroalloys, China's rising silicon metal output has been export-driven in recent years, though exports have fallen slightly in 2015



Chinese exports almost doubled from 2012 to 2014. Though exports have fallen slightly in 2015, exports to Japan and Europe have continued to rise



Outside of China, the main development in silicon metal production has been reduced Brazilian output, due to electricity shortages



- Brazilian output has halved since 2011, due to electricity shortages
- Following expiry of long-term power contracts at end-2014, many producers were unable to secure competitively priced power, and idled their production
- Higher output in Norway, partly due to furnace conversion from FeSi
- New furnace in Australia, on-stream since 2012
- Overall, non-Chinese output has been broadly stable for 15 years
- New projects proposed in Canada and Iceland

Many silicon metal plants in Brazil are in the southern state of Minas Gerais, where the electricity situation has been particularly bad



Location of main silicon metal and FeSi plants in Brazil:

*In Para:
CCM (Dow Corning)*

*In Bahia:
Ferbasa*

*In Minas Gerais:
CBCC (Dow Corning)
RIMA Capitaó Eneas
RIMA Varzea da Palma
Minasligas
LIASA
Nova Era
Italmagnesio
Bozel*

Summary of recent developments in Brazil

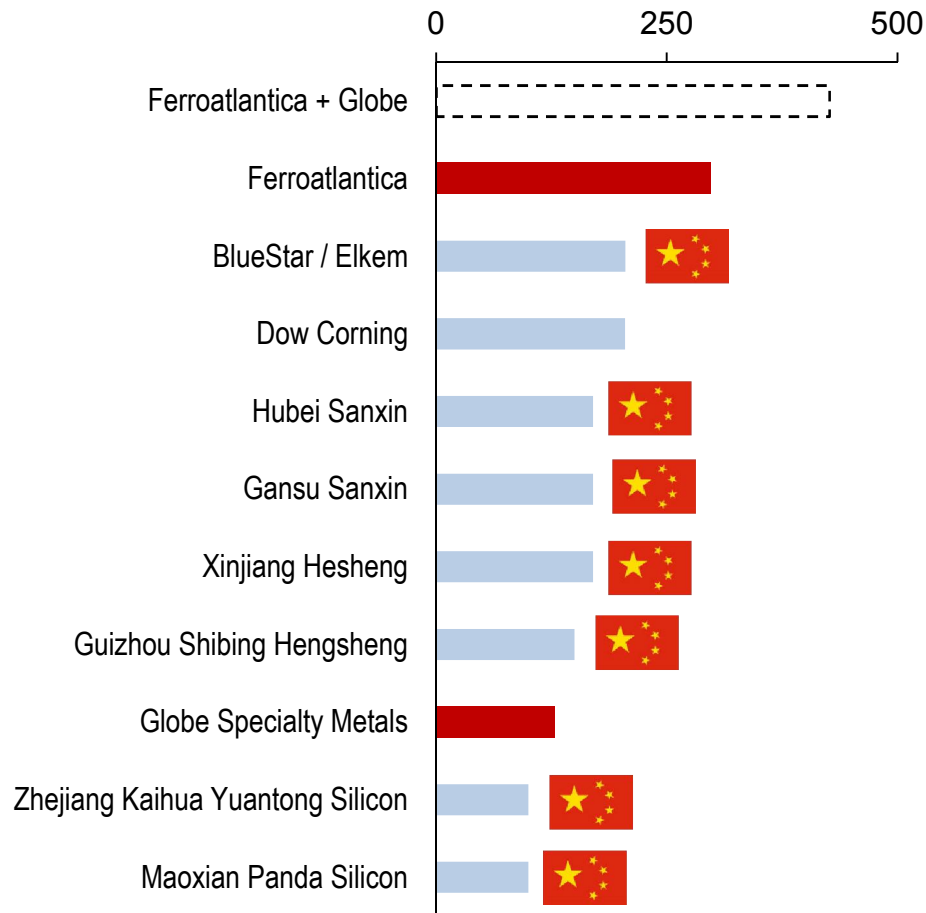
- The impact of the electricity shortages has been very uneven across Brazilian producers in 2015
- Northern plants have been producing at close to normal levels whilst most capacity in Minas Gerais has been idle; in essence Dow Corning has been least impacted whilst most smaller producers have been badly affected
- Ferroalloy plants in northern Brazil negotiated favourable power contracts in mid-2015 lasting into the 2030s, average tariff in USD lower than in 2014 due to weak local currency
- Plants in Minas Gerais reported to be in the midst of negotiating new power agreements. Some production likely to return in Q4-2015, though dependent on the state of the market
- Brazilian output in 2016 highly likely to increase relative to 2015

Proposed Globe-Ferroatlantica merger: Summary of publicly-released information

- New company has estimated value of US\$3.1bn
- Transaction expected to close in Q4-2015
- New company to be headquartered in London, listed in New York
- To be led by Alan Kestanbaum (Globe executive chairman); Joint CEOs will be Jeff Bradley (Globe CEO) and Pedro Larrea Paguaga (Ferroatlantica chairman and CEO)
- Expected cost savings of US\$65M per year; debt expected to fall by US\$30M over 3 years and cash flow to improve by US\$100M (more efficient management of working capital and other efficiency savings)
- Approved by shareholders of Globe Specialty Metals in Sep 2015; still subject to approval by regulators in relevant jurisdictions

The proposed merged company's silicon metal capacity would be twice that of the second-largest producer

World top-10 silicon metal producers by capacity (kt)



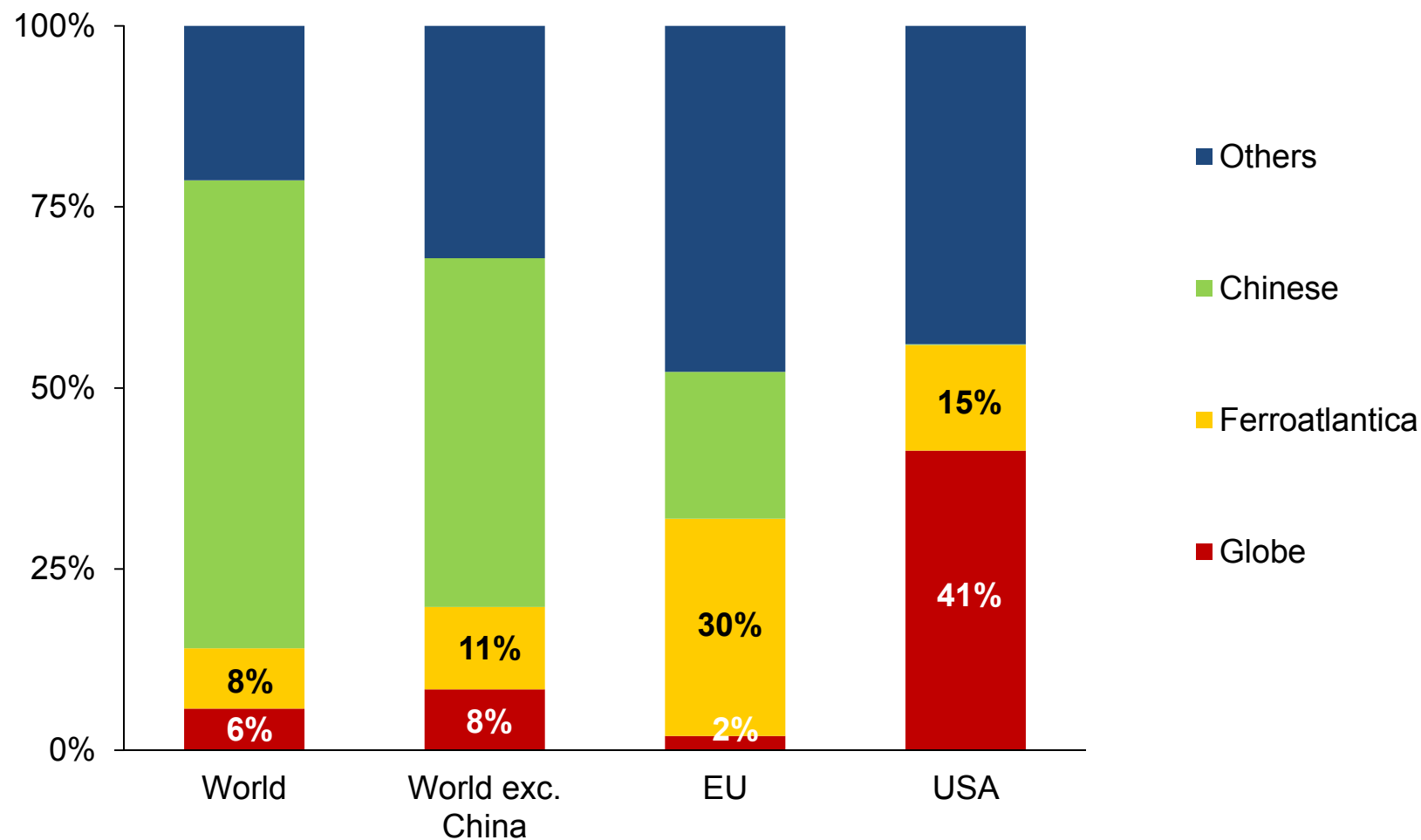
Ferroatlantica already world's biggest producer of silicon metal

Globe currently world's 8th biggest producer (3rd largest non-Chinese owned producer)

New company will have silicon metal capacity approx. twice the size of the second largest producer

The merged company's biggest impact on silicon metal market share will be in the USA

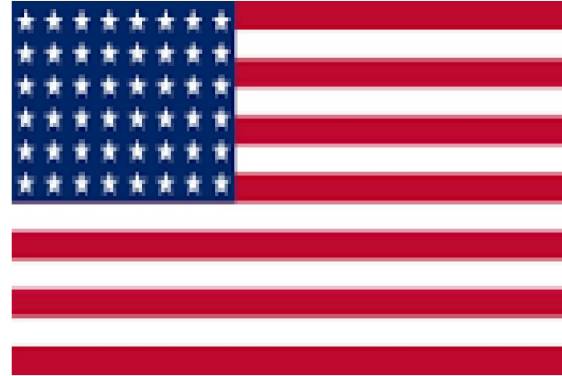
Estimated silicon metal market share by supplier (2014)



Silicon metal anti-dumping update



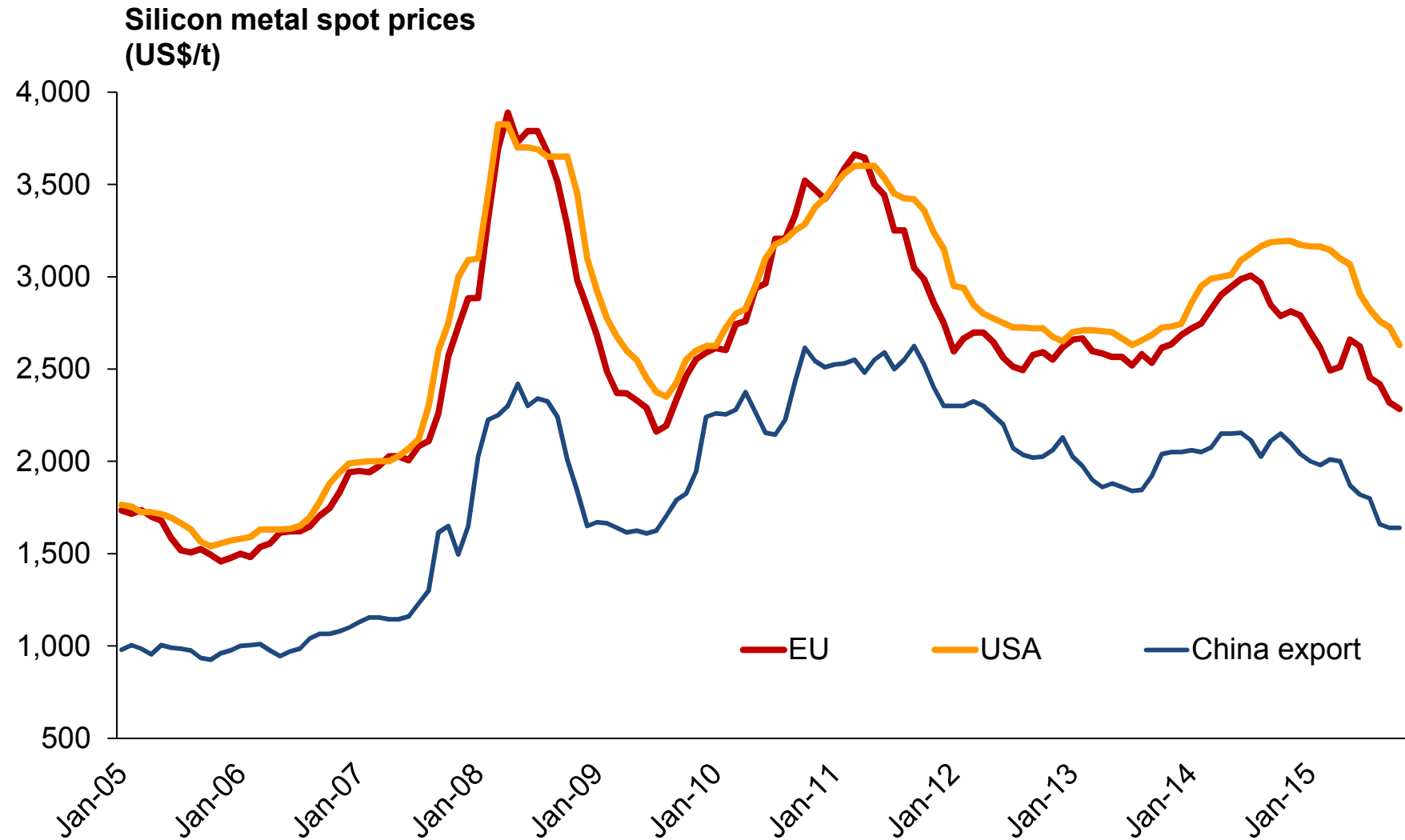
- EU anti-dumping duties against Chinese silicon metal expire in 2015, and the investigation into their potential renewal is at an advanced stage



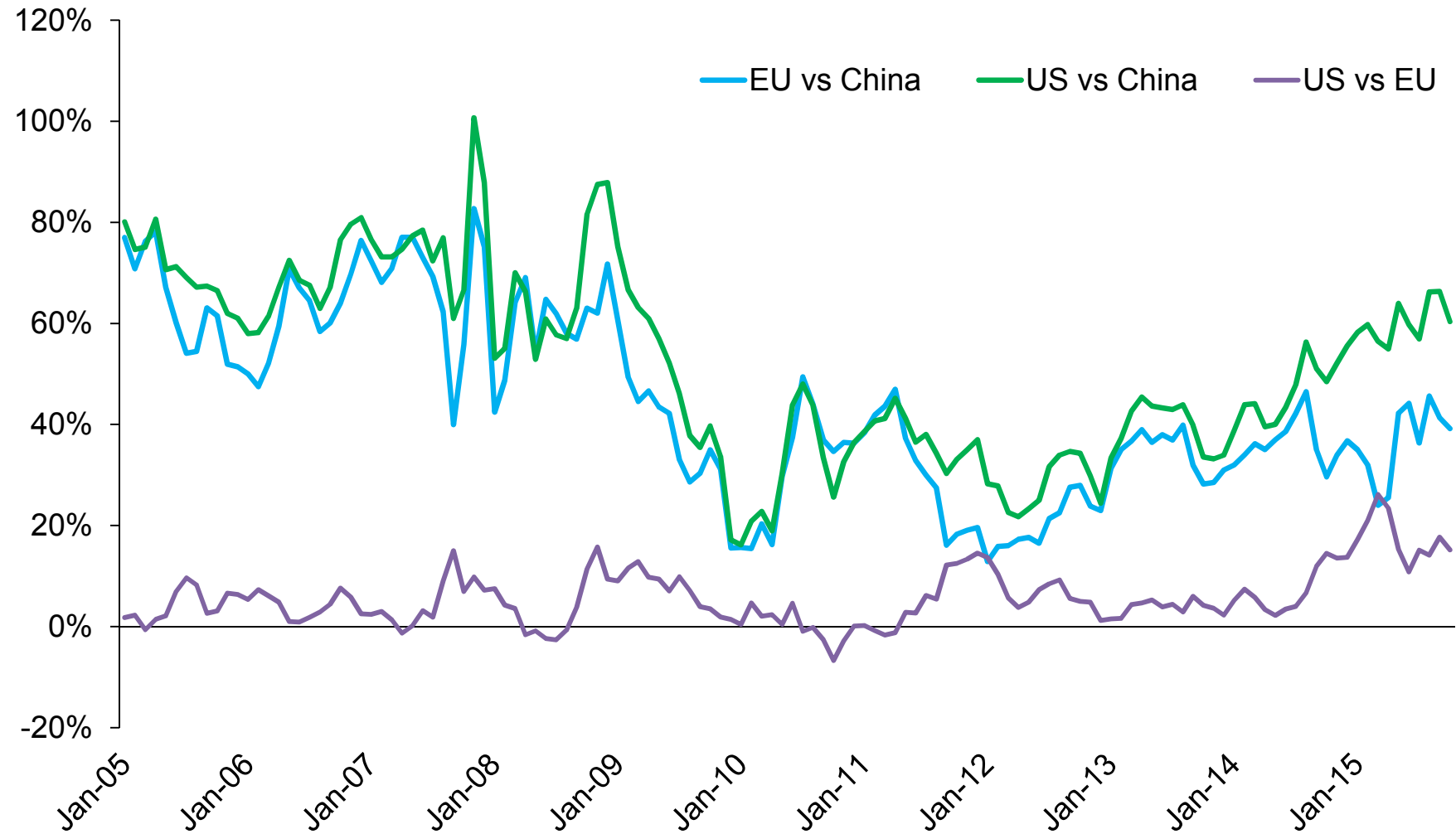
- US anti dumping duties against Russian and Chinese silicon metal are not (ordinarily) scheduled for review until 2017/18

AD duties on Chinese silicon metal also in place in Canada and Australia

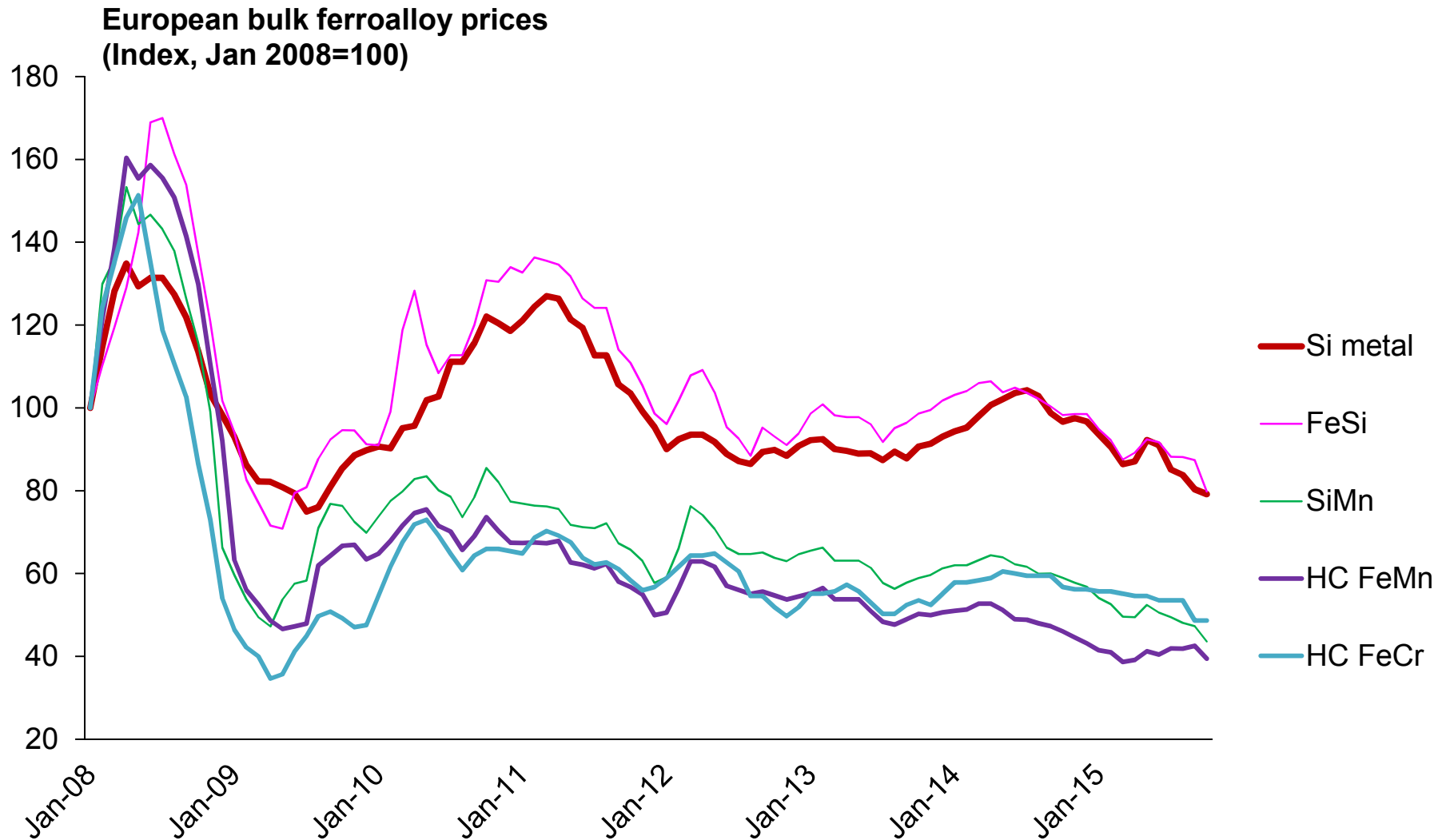
Silicon metal spot prices – 10 year history



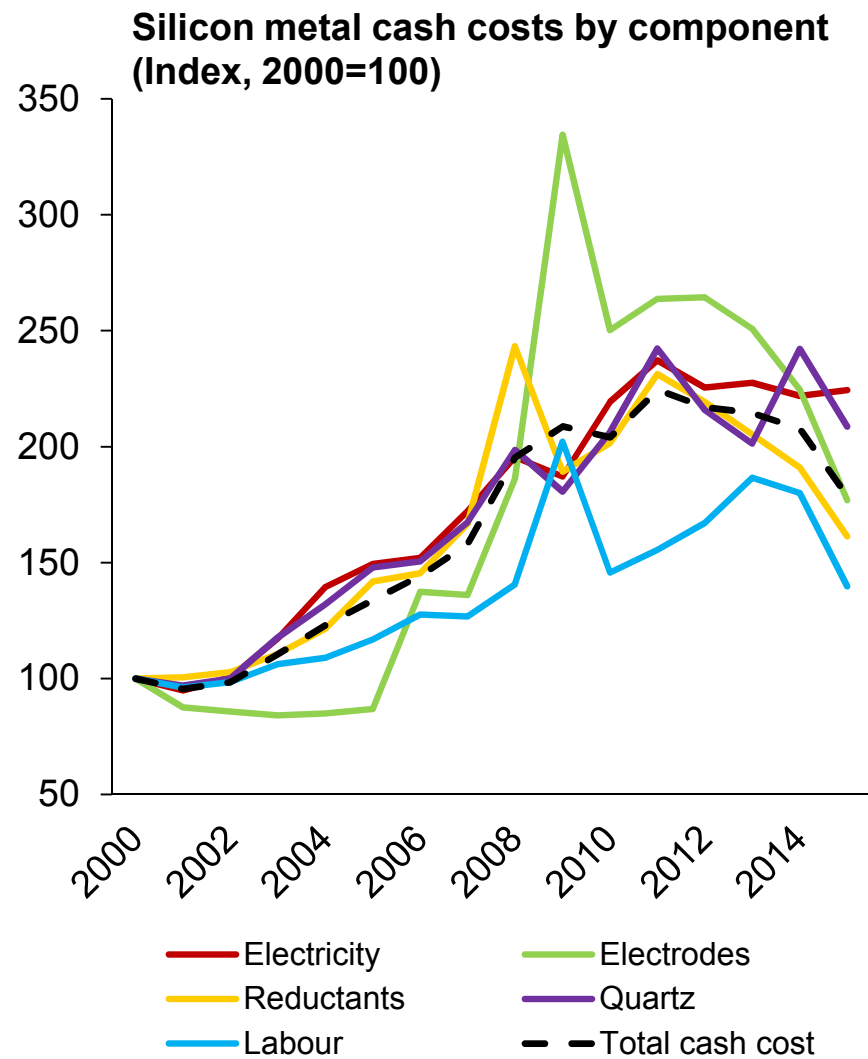
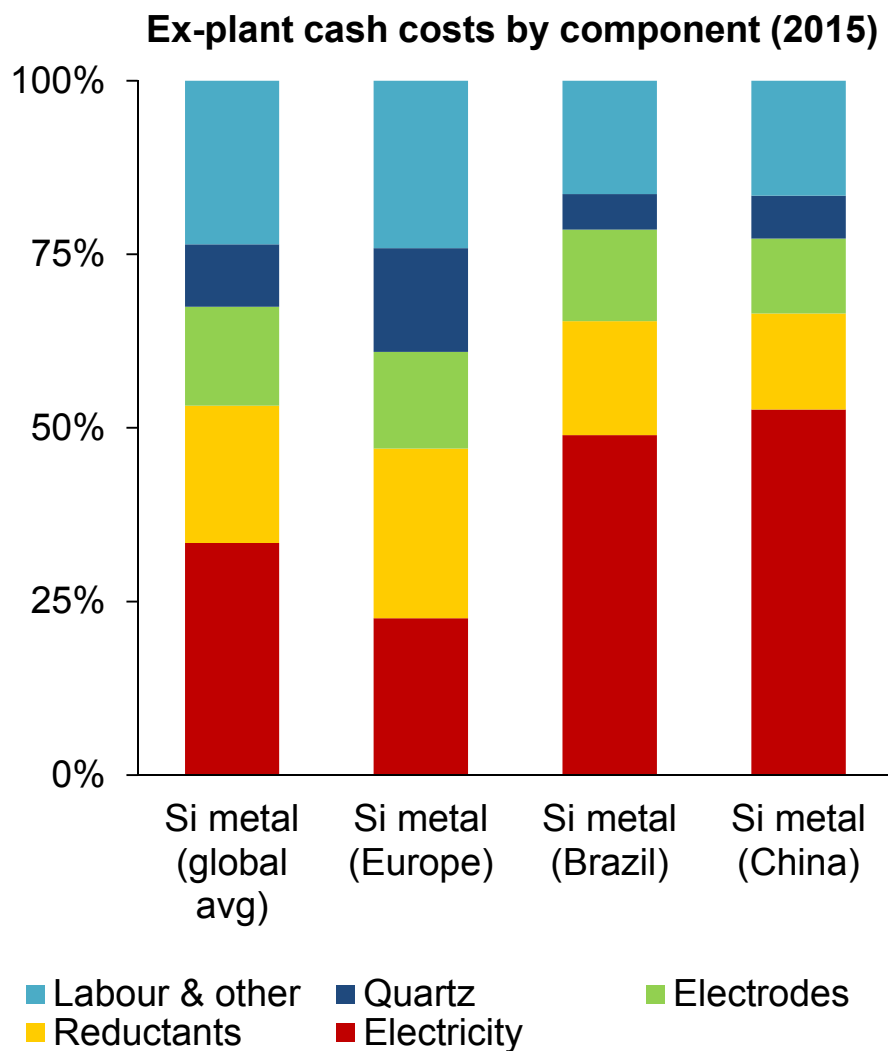
Silicon metal spot price premiums – 10 year history



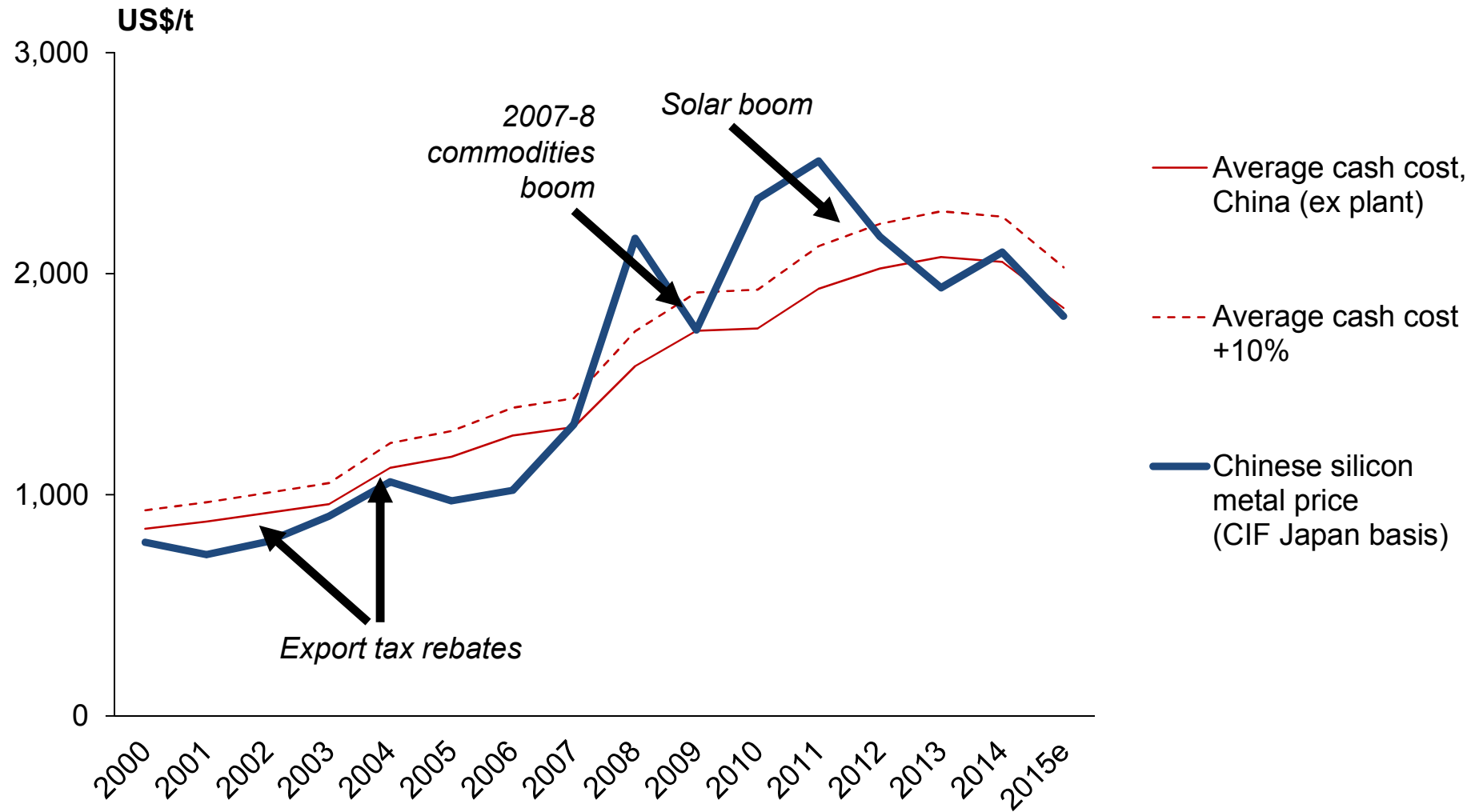
Silicon metal prices have significantly outperformed Mn alloys & FeCr since 2008, and have maintained a very close correlation with FeSi



Silicon metal production costs are driven by electricity and reductant costs....average cash costs have declined significantly in 2015



The level of Chinese silicon metal prices is increasingly being set by the average cash production cost





Thank you for your attention



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