



# **ZIRCON** INDUSTRY ASSOCIATION

**The ZIA and Zircon**

**Industrial Minerals, Vancouver, April 2<sup>nd</sup> 2014**



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- ❖ Introduction to ZIA
- ❖ Substitution of zircon in ceramic applications
- ❖ Technical handbook on zirconium and zirconium compounds
- ❖ Regulatory issues
- ❖ Zircon supply
- ❖ Key messages

# Genesis of Zircon Industry Association

- ❖ The Zircon Industry Association was conceived in 2012 and became a reality on January 1<sup>st</sup> 2013.
- ❖ Its genesis was offensive with the primary objective of facilitating demand expansion through education, information and promotion.
- ❖ At the same time, like all commodities, Zircon and its derivatives face a number of threats:
  - from thrifting and competition from substitute materials
  - from ever increasing regulation
- ❖ The zirconium value chain had no industry body to represent and promote its interests.

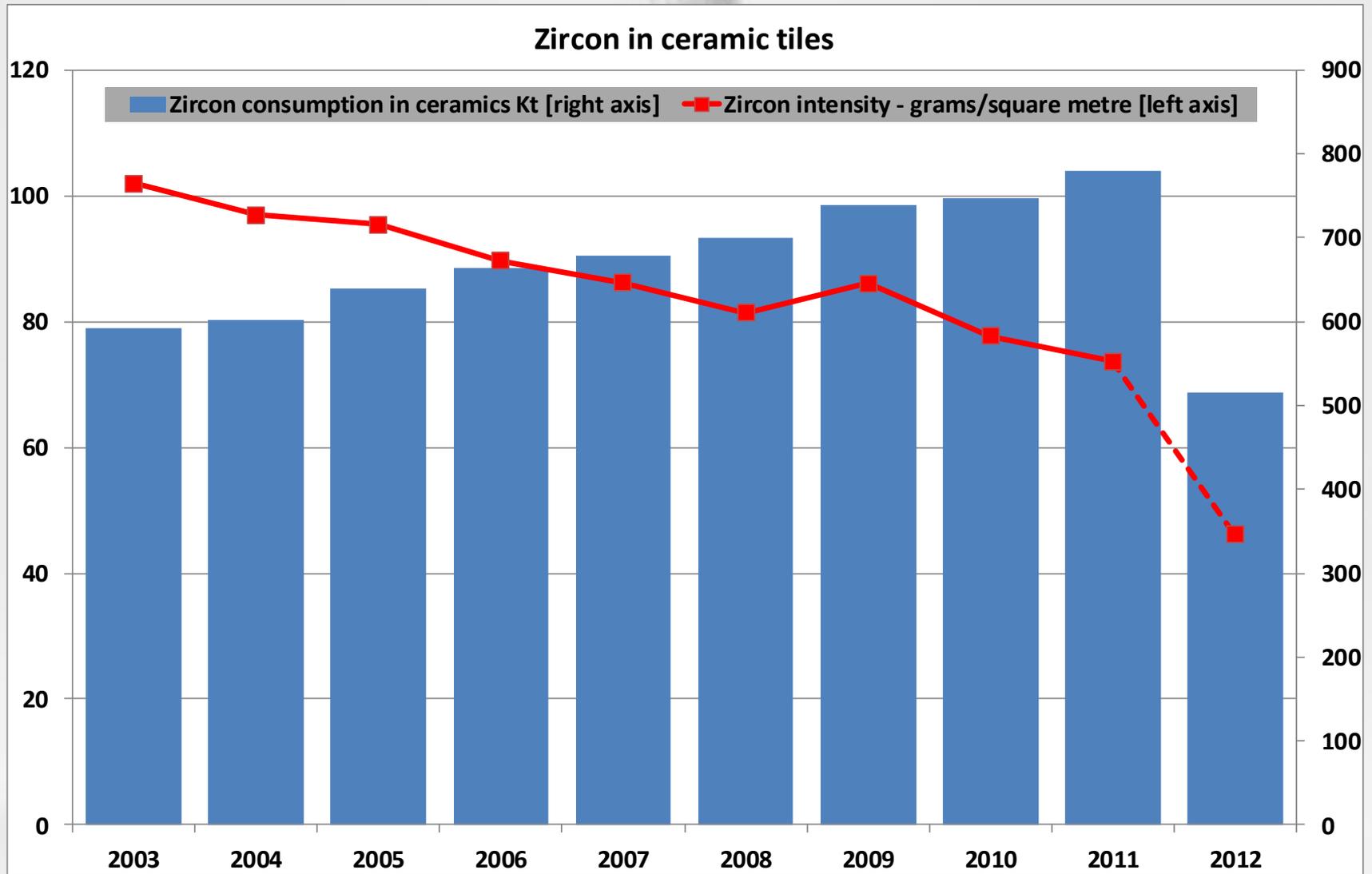
# Members - representing 80% of traded zircon supply



# Main thrust of Zircon Industry Association

- ❖ **Market development and support:**
  - Existing applications
  - Innovation and new applications
- ❖ **Regulatory support:**
  - NORM
  - Other regulations
- ❖ **Communications:**
  - Getting the right messages to stakeholders

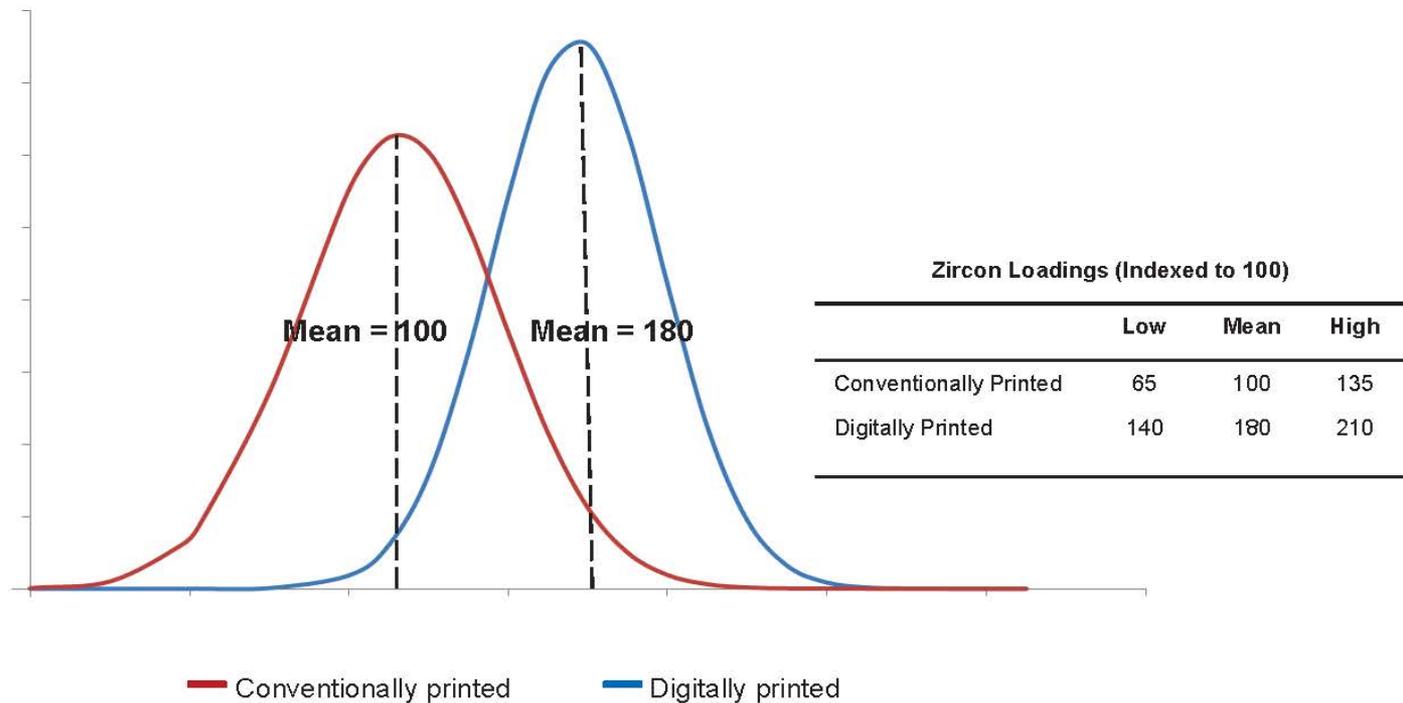
# Zircon in ceramic applications



Data sources: TZMI, ACIMAC



# Zircon usage for digital printing



## Notes:

- This slide charts the distribution of zircon loadings for conventionally printed and digitally printed tiles, from Iluka's 2013 ceramics tile survey. The zircon distribution is shown as grams/sqm (data excluded for proprietary reasons).
- The mean of conventionally printed tile zircon loadings is shown as 100. Digitally printed mean zircon loading is shown as 180, hence 80% higher than the mean of conventionally printed tiles. The low and high zircon loadings for both types of tiles are shown in the table at 5% and 95% confidence intervals.

Source: Iluka 2013 Full Year Results presentation 21/02/2014

- ❖ ZIA has commissioned testwork to compare zircon with substitute materials in ceramic applications, alumina being the principal substitute.
- ❖ Tests carried out at Instituto de Tecnología Cerámica, Castellon, Spain, using 5  $\mu\text{m}$  zircon opacifier
- ❖ Ceramic applications:
  - Ceramic bodies
  - Frits
  - Glazes
  - Engobes

# Preliminary findings

Ceramic application for zircon	Substitutes evaluated in this study	Main conclusions
Engobes	2 different aluminas	Alumina can be used to substitute zircon in engobes but the flux content of the engobe must be <u>increased</u> to compensate for the refractoriness of alumina
Glazes	2 different aluminas	Alumina is a suitable substitute for zircon only in glazes which have <u>low gloss</u>
Porcelain tile bodies	2 different aluminas	Substitution of zircon with alumina is possible but alumina is <u>less effective</u> as a whitener on a weight basis, and causes the firing temperature to increase
	1 whitening additive	The whitening additive gives a <u>poor result</u> – lower fired whiteness and significantly worse slurry behaviour, even with extra deflocculant
Frits	1 TiO <sub>2</sub> -based white frit	There are <u>no viable substitutes</u> today for zircon-based white frits





1. Introduction
2. Material properties
3. State of the art applications
4. Emerging R & D
5. References

Available via the contact form at  
[www.zircon-association.org](http://www.zircon-association.org)

## Technical handbook on zirconium and zirconium compounds

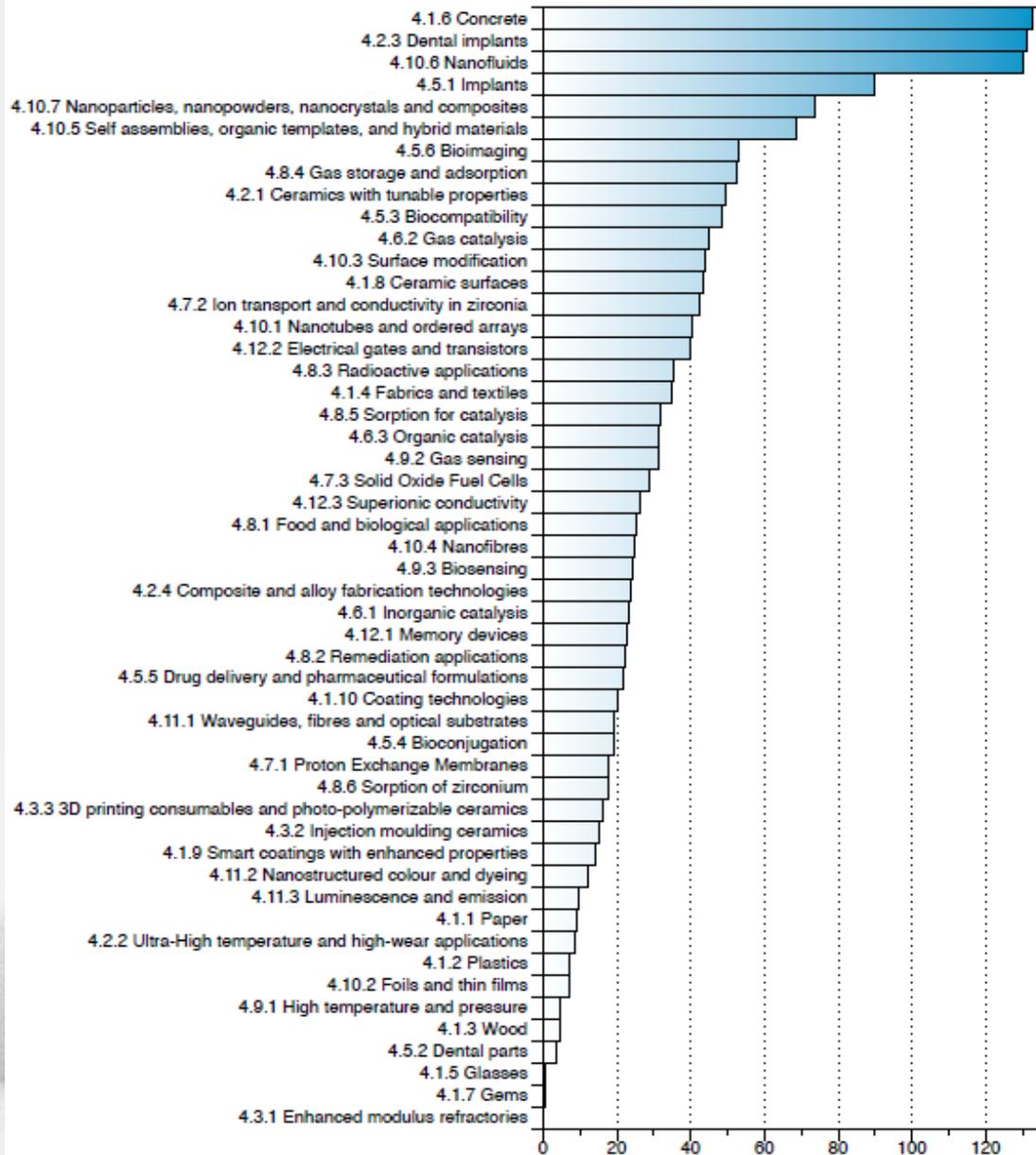
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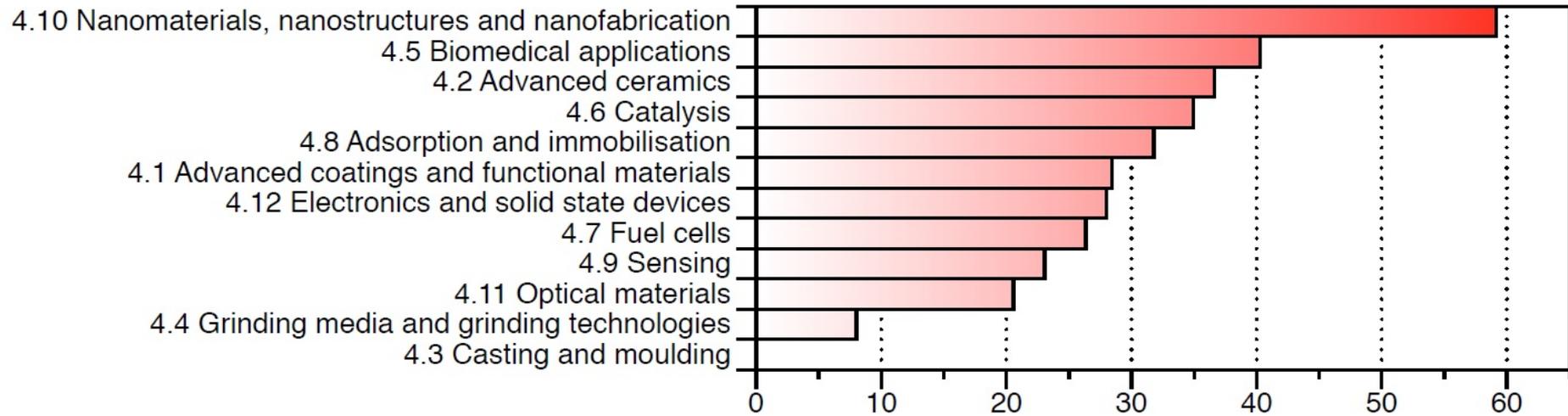
Images courtesy of Iluka Resources

# Research trends

- Zircon is present in numerous applications of distinct technological level and complexity.
- All research trends are strongly related to zirconium's fundamental properties:
  - Thermal resistance
  - Good refractory material
  - Biocompatibility with human body and environment
  - Catalytic properties
  - Etc.
- 347 references



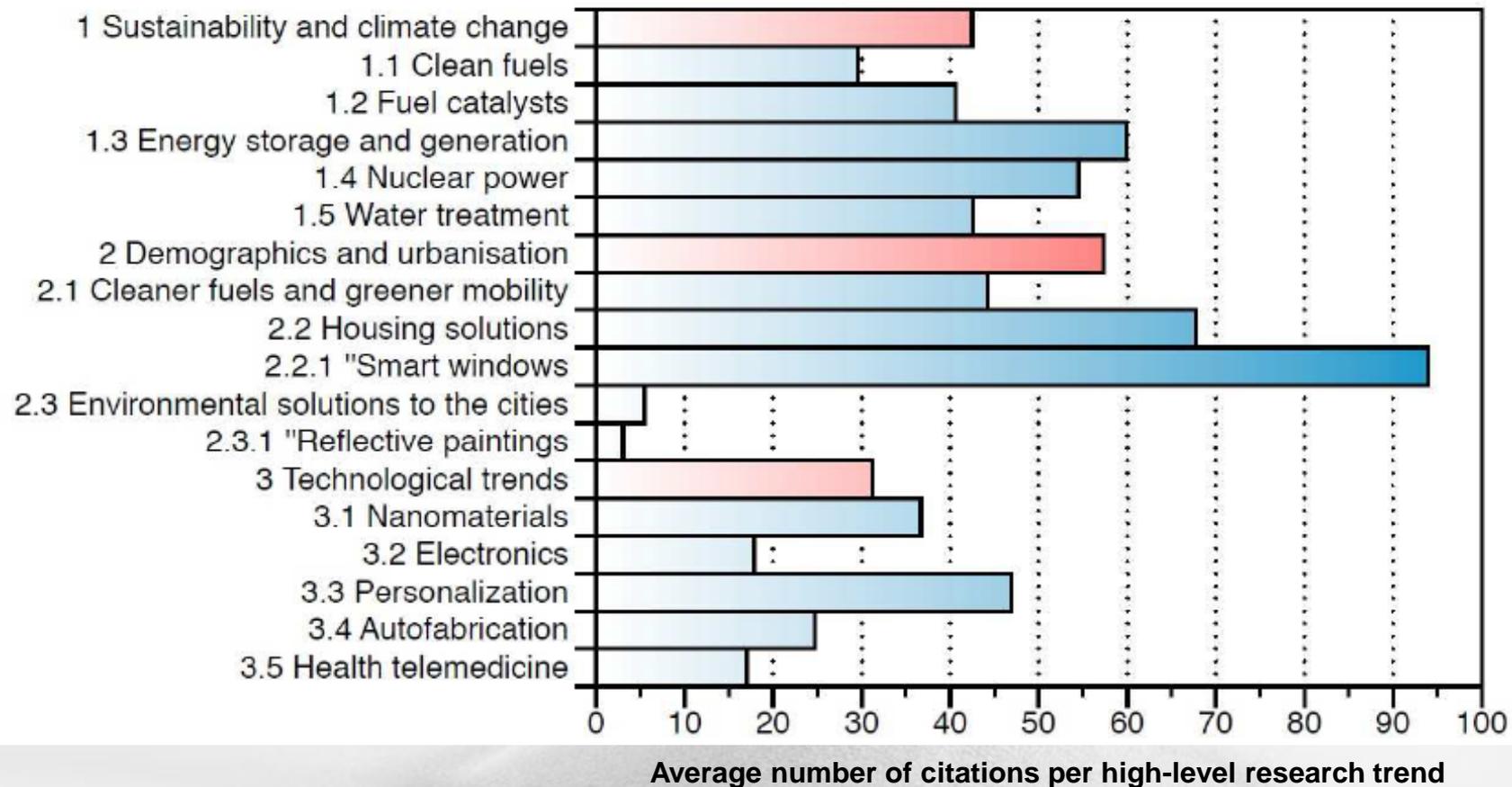
# Research topics



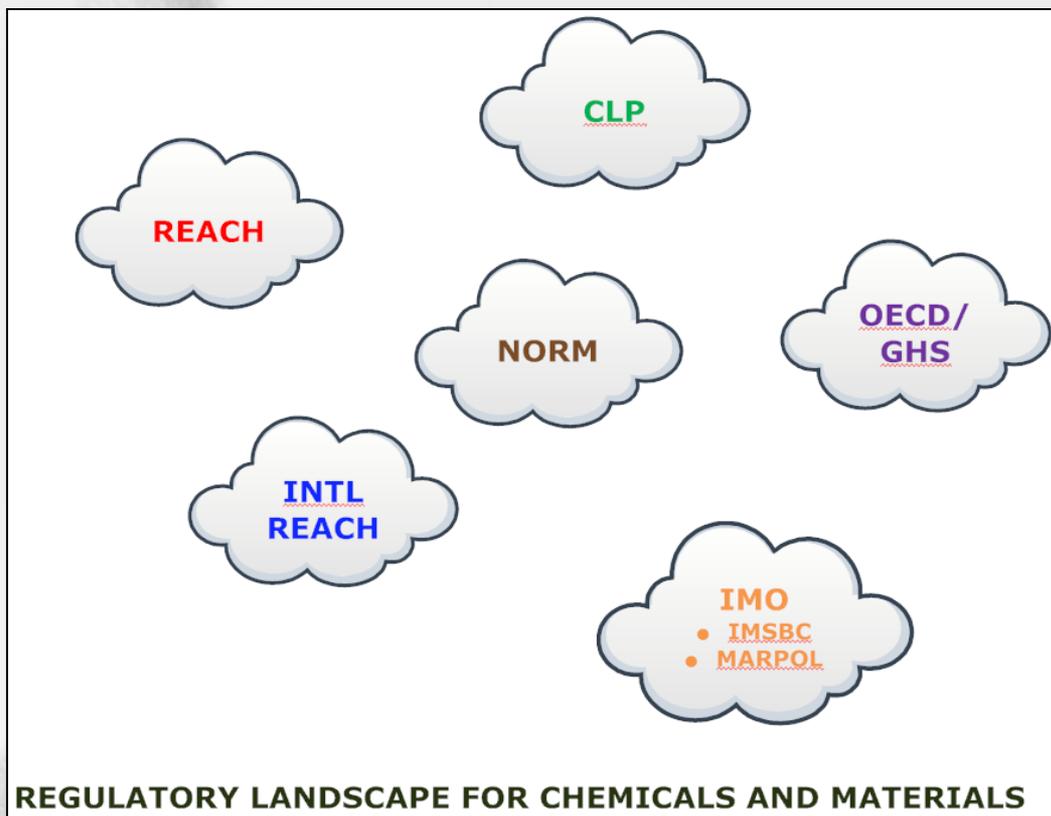
Average number of citations per research topic



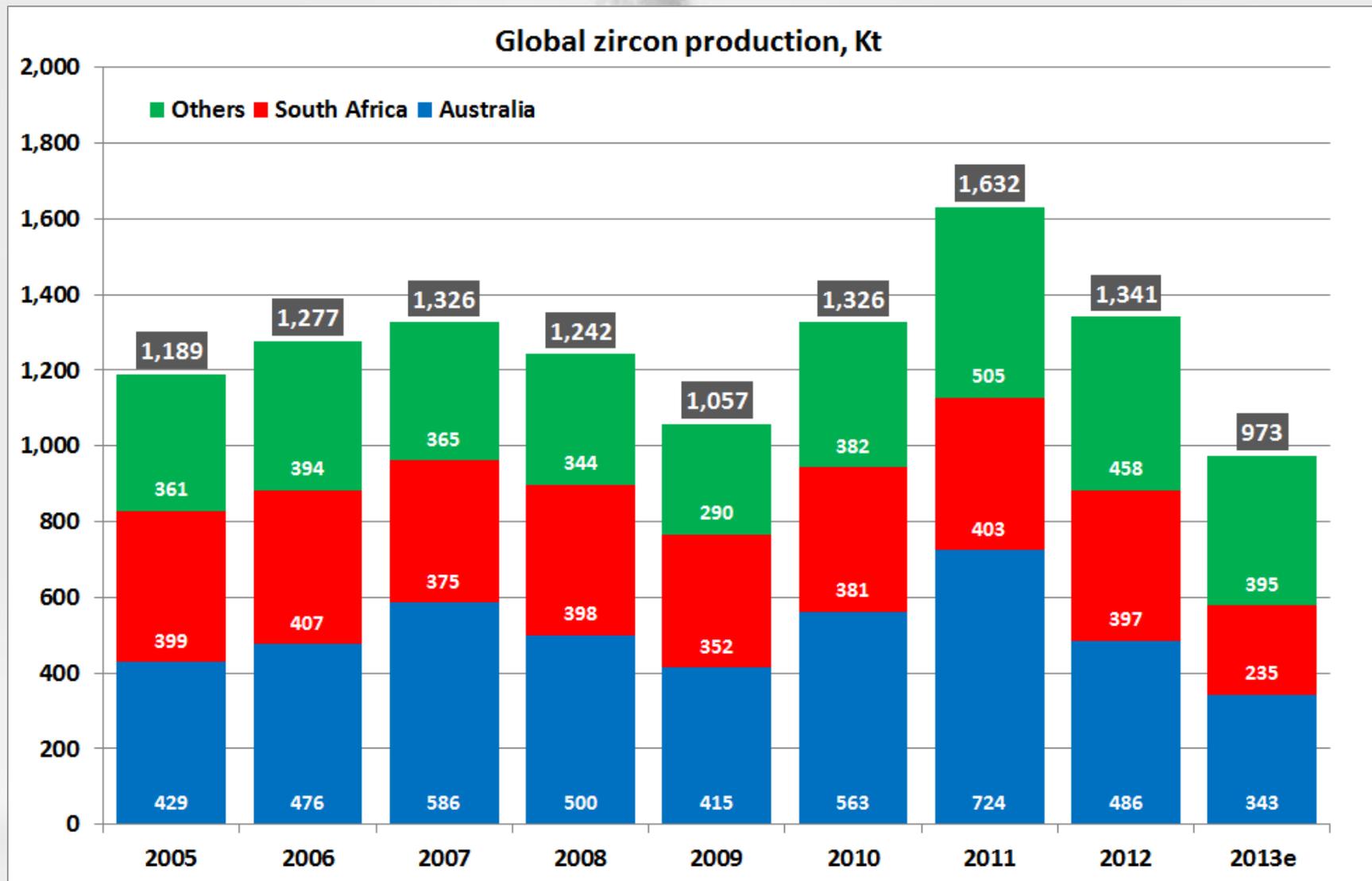
# Relation to high-level research trends



- ❖ Regulatory support:
  - radioactivity issues
  - chemical industry regulations, etc.
  - Transport regulations
  - lobbying for sensible and practicable regulations



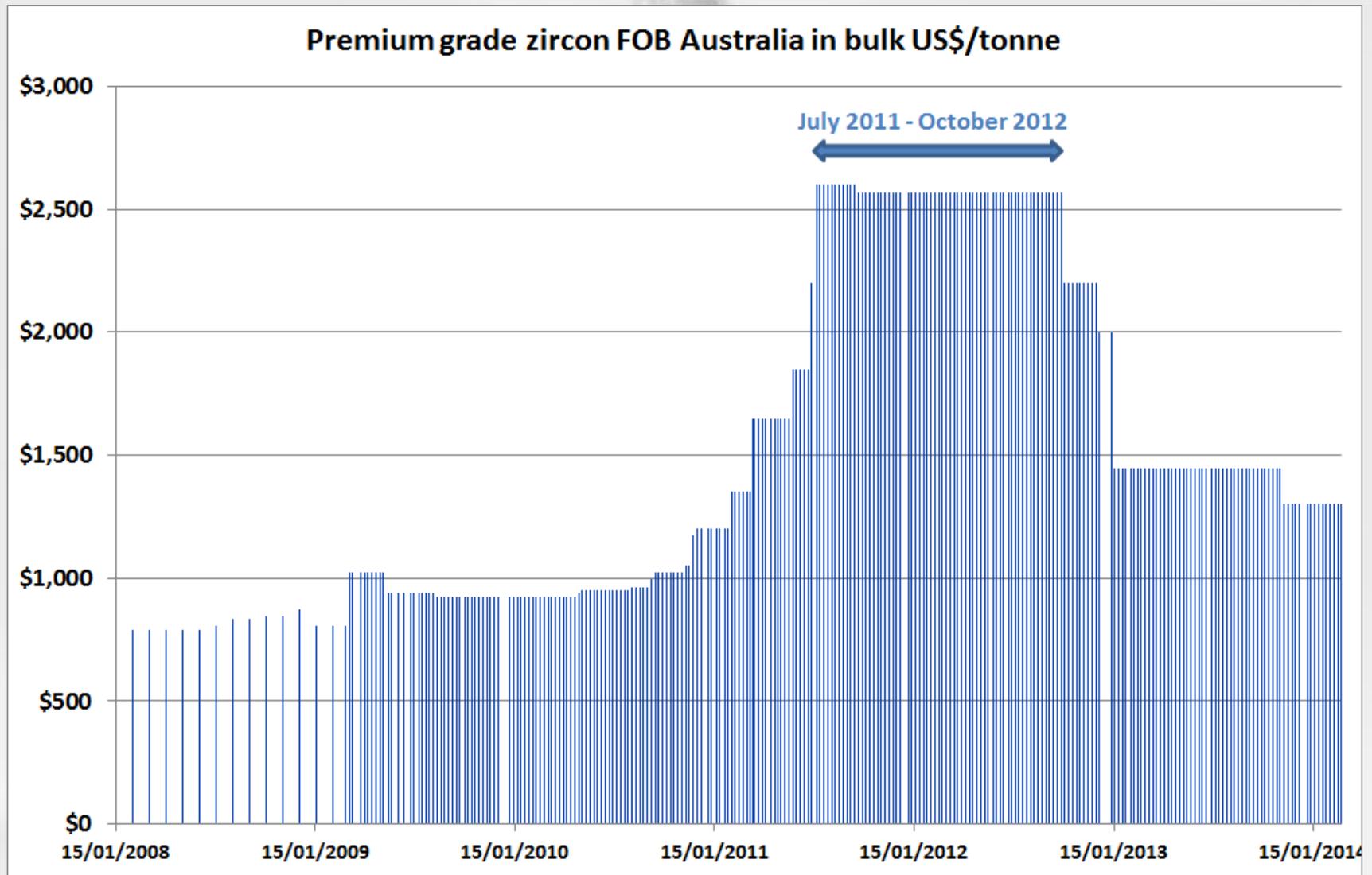
# Zircon production



Data source: TZMI



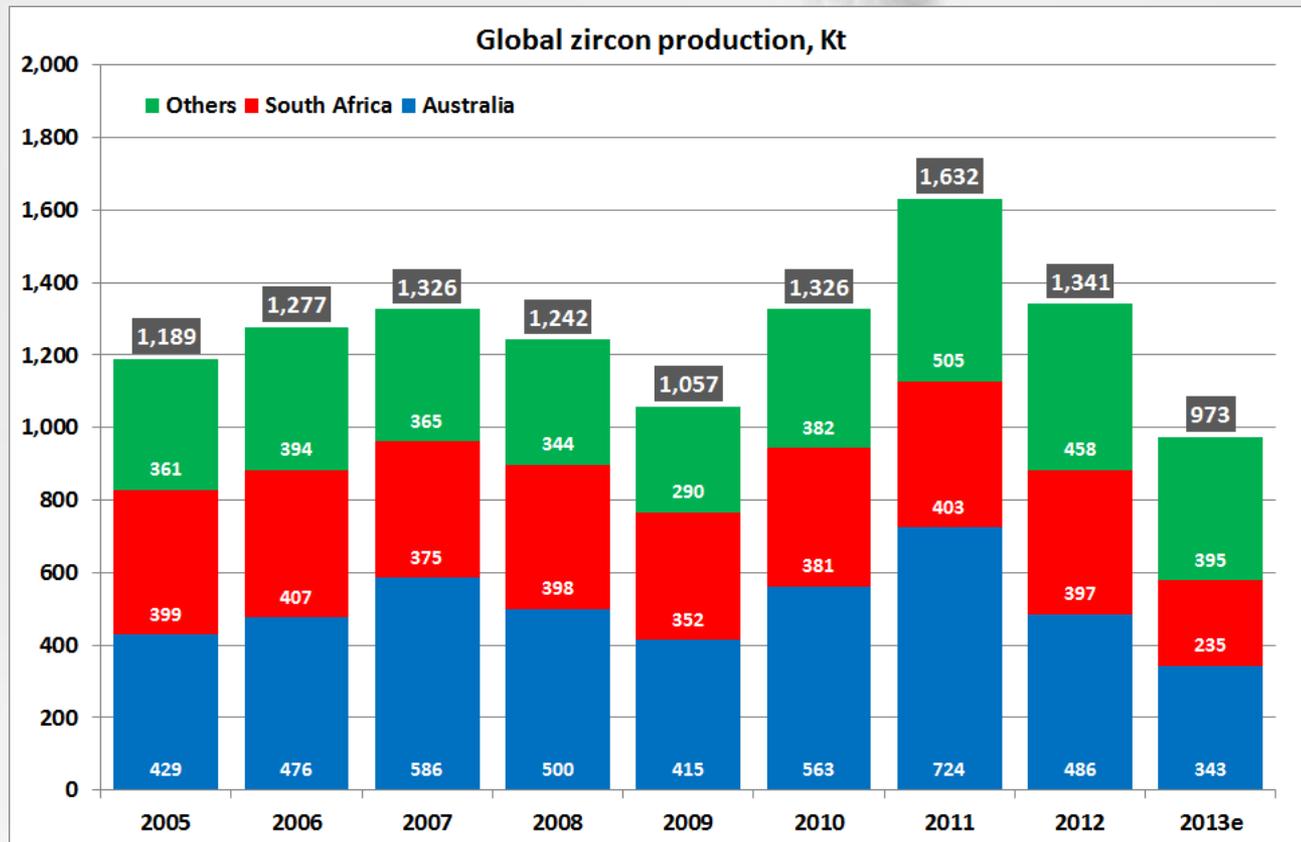
# Zircon price development



Data source: Industrial Minerals



# Future supply potential - latent existing capacity



$\Delta$  2013/2011  
659 Kt



# New zircon production capacity in 2014

- ❖ **Base Resources: Kwale mineral sands project in Kenya**
  - Zircon circuit now in production - capacity 30,000 tpy zircon over first seven years, dropping to 19,000 tpy for following 6 years
- ❖ **TiZir Ltd: Grande Côte project in Senegal**
  - Mining started in March 2014, ± 40,000 t in 2014, 85,000 tpy zircon from 2015
- ❖ **Kenmare Resources: Moma Phase 2 expansion project**
  - Zircon capacity increase from 50,000 t to 75,000 t - now ramping up
- ❖ **Southern Ionics: Georgia operations, USA**
  - 5,000 t zircon in 2014, building up to about 30,000 tpy



# Projects of the major producers

## ❖ Iluka Resources:

- Cataby, in WA (DFS stage)
- Balarand in NSW (DFS stage)
- JA satellite deposits in SA (PFS stage)
- Hickory in Virginia, USA (PFS Stage)
- Aurelian Springs in N. Carolina, USA (PFS stage)

## ❖ Richards Bay Minerals (Rio Tinto Iron & Titanium):

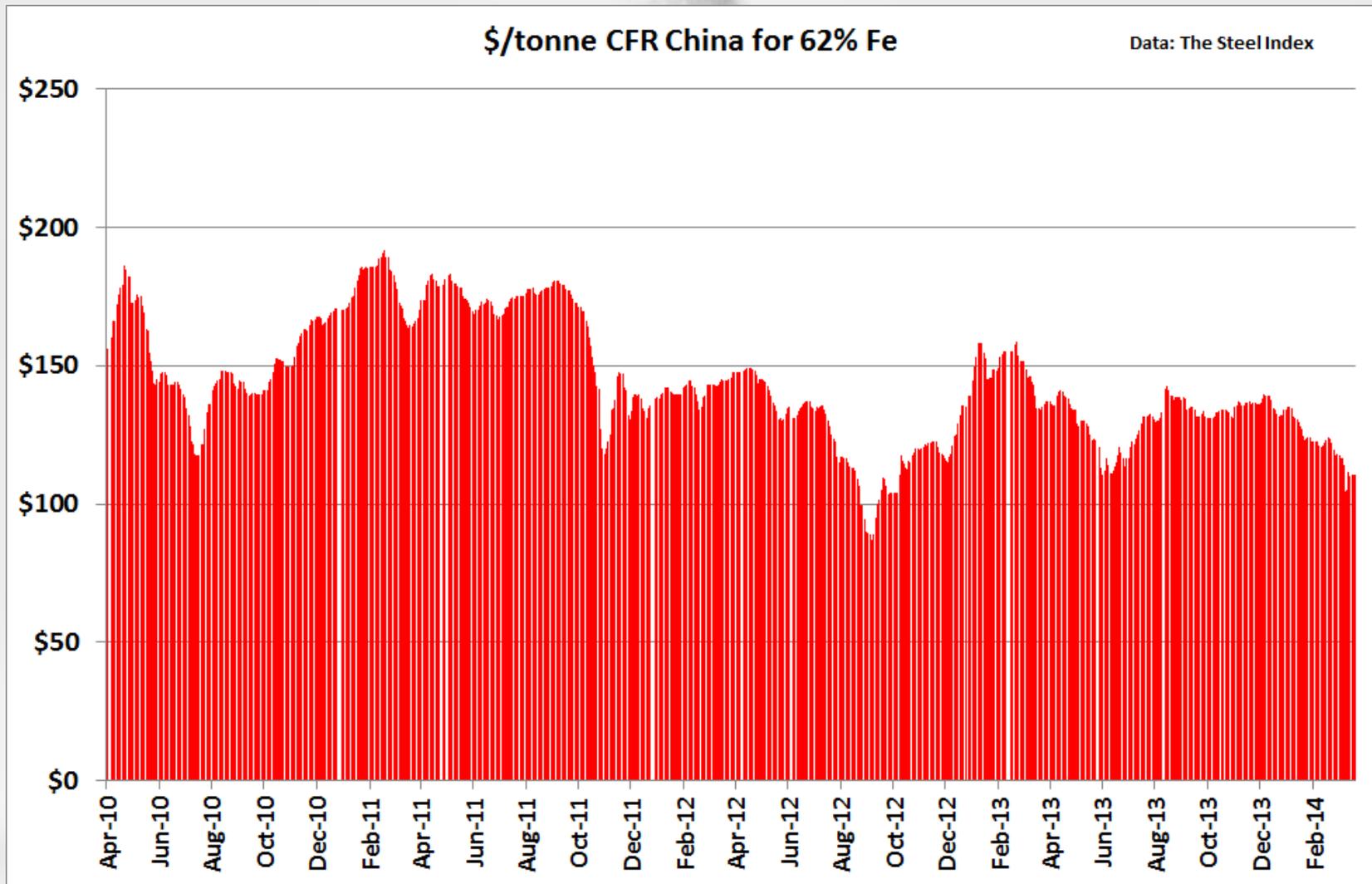
- Zulti South mine, KwaZulu-Natal, South Africa (25 year mine life, 2016-2041)

## ❖ Tronox Sands

- Fairbreeze mine, KwaZulu-Natal, South Africa (under construction, 2015 start-up)



# The iron ore experience



# Key messages

- ❖ Zircon and its derivatives provide a unique and versatile range of properties which offer a platform for sustainable industry growth.
- ❖ We need to defend our existing markets whilst at the same time developing new ones.
- ❖ Subject to caveats, zircon supply should not be an impediment to growth in demand.
- ❖ Less volatility than seen in recent times will rebuild confidence in the value chain.
- ❖ We need to lobby for sensible and practicable regulation.
- ❖ To those in the zirconium value chain who are not members of ZIA, please support your industry and join us!

Thank you for your attention!

Black zirconium oxide ceramic dial



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