

# **EXXARO SANDS – Is there enough high grade feedstock available in the next 10 years?**

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**exxaro**

**POWERING POSSIBILITY**



## DISCLAIMER

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***This presentation includes certain information that is based on reasonable expectations and assumptions. These forward looking statements include, but are not limited to, statements regarding estimates, intentions and beliefs, as well as anticipated future productions, reserves, cost and market conditions. While Exxaro Sands has prepared this information using the best of its experience and judgment, in all good faith, there are risks and uncertainties involved which could cause results to differ from projections.***





**Supply/Demand of CP grade feedstock**

**How will future supply/demand gap be filled?**

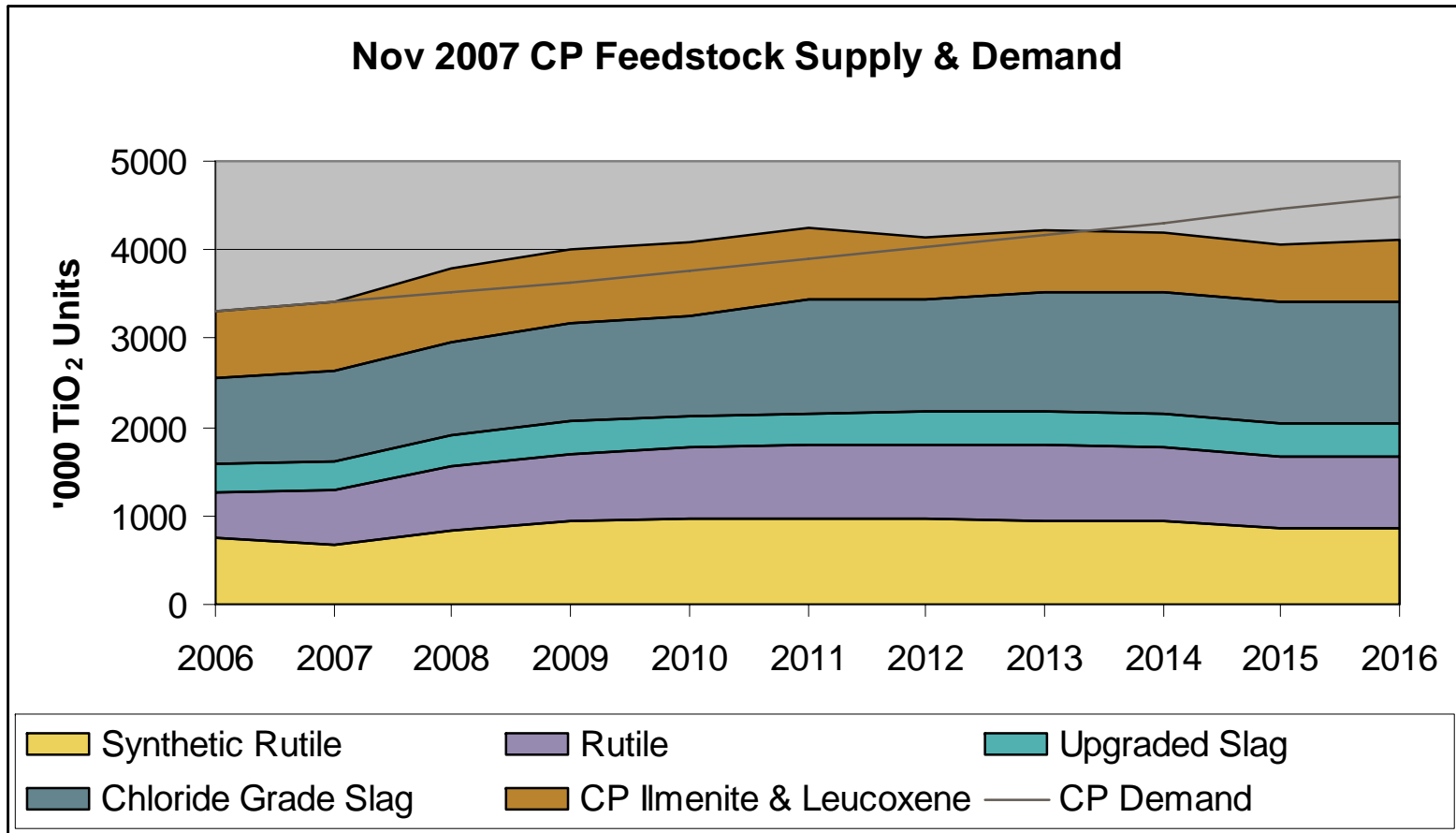
**Barriers to entry in slag production**

**Conclusion**



# XX Supply/Demand of CP feedstock : November 2007

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## High Grade Feedstock

Source : Exxaro Sands

- Growth follows pigment trends
- Feedstocks surplus as a result of **new projects**
- Historically oversupply was always less than anticipated.



Oversupply forecast until 2014



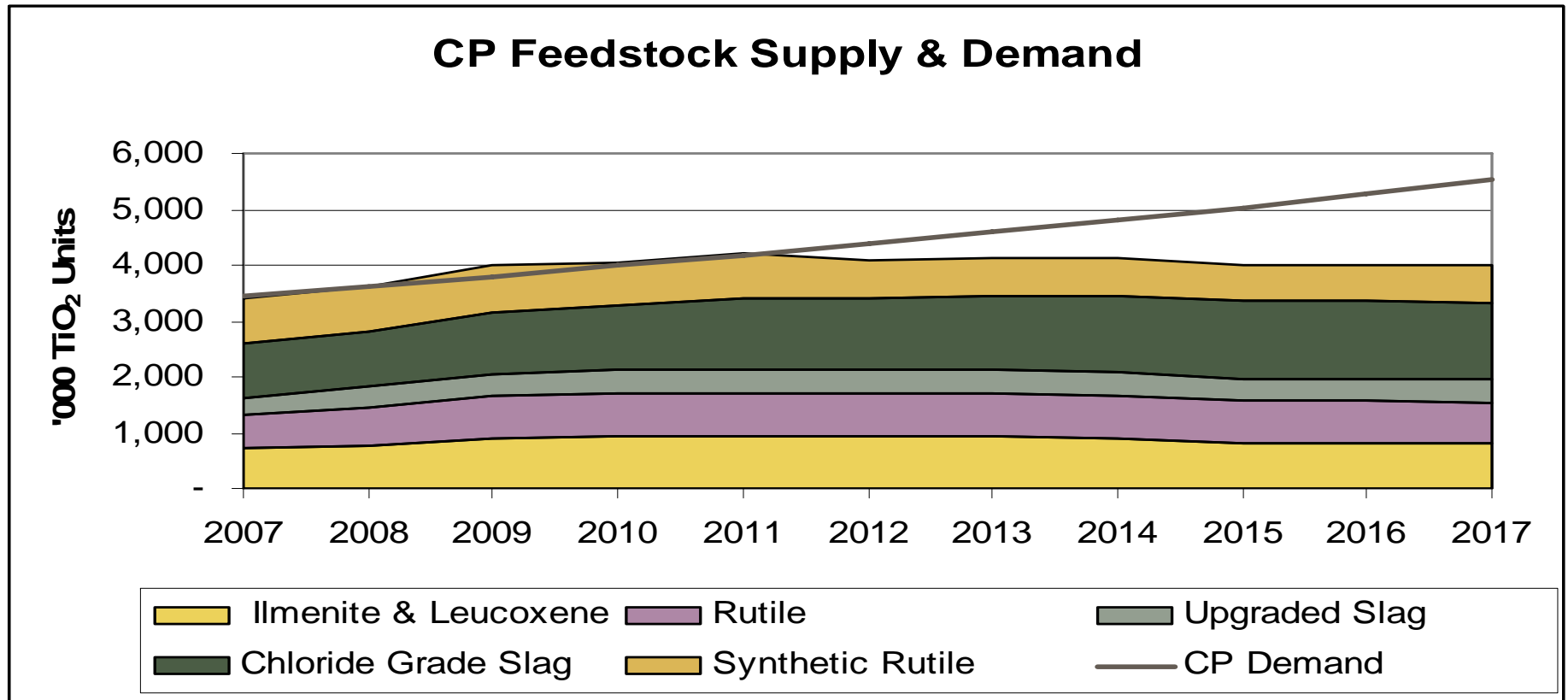
## New factors influencing supply/demand

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- >10% decrease in production from SA as a result of electricity cuts
- Fundamentals of industry and impact on new project:
  - Significant increase in capital costs
  - Significant increase in operational costs
  - Ramp-up lower than planned
  - Profitability of industry on all time low
  - Skills shortage
  - Availability of funds limited and expensive
- US economy
- China's move towards high grade ore
- Russia and Vietnam intention on titanium (others to follow?)
- Unplanned shuts/operational stability



Oversupply as forecasted during 2007 will not materialise



Included: SRL (DII), QMM (Phase 1), Monto Minerals, Australian Zircon and Moma



Modest oversupply forecast for the short term



Supply/Demand of high grade feedstock

**How will future supply/demand gap be filled?**

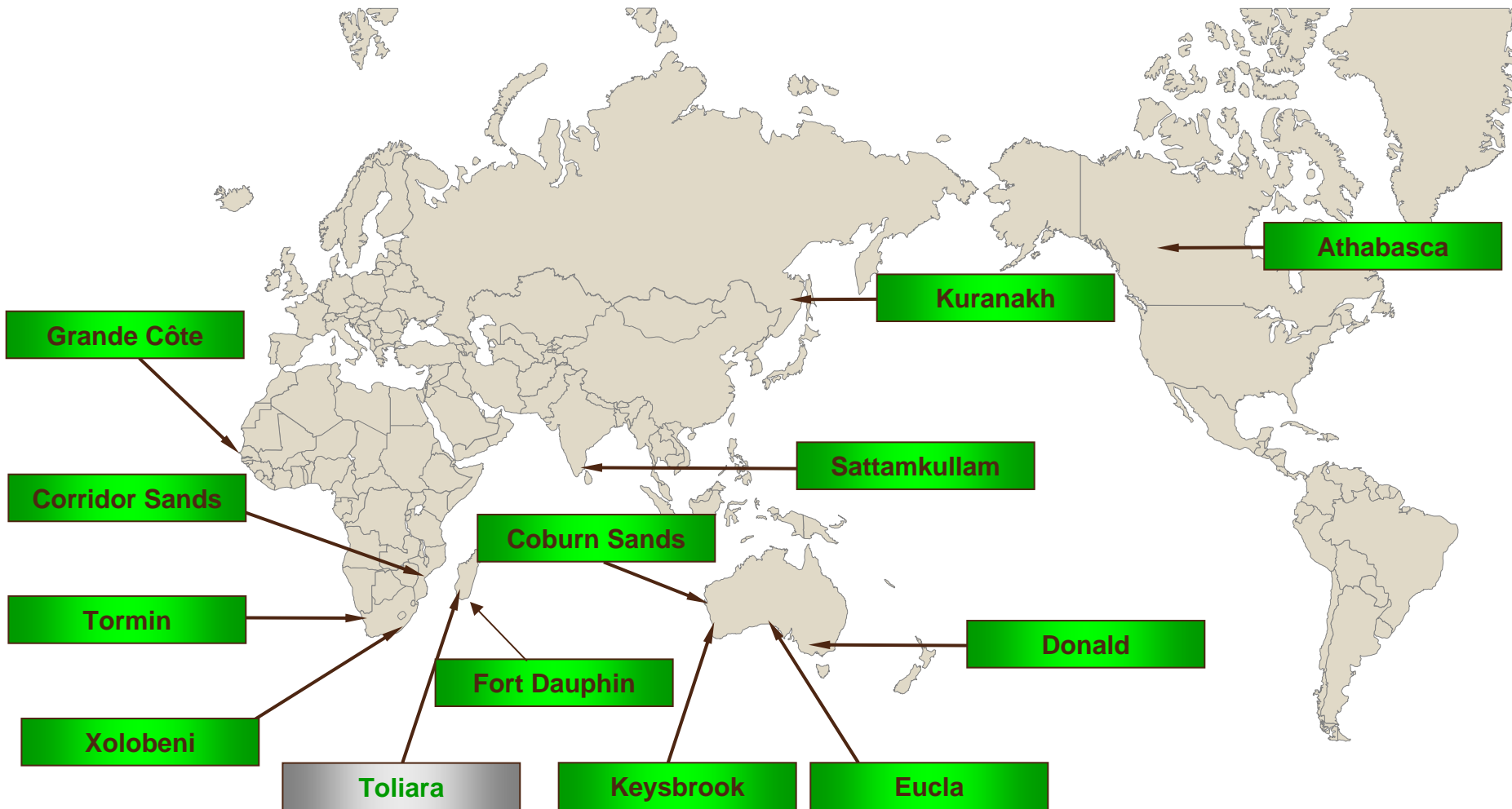
Barriers to entry in slag production

Conclusion





# Which resources could be developed to fill gap?



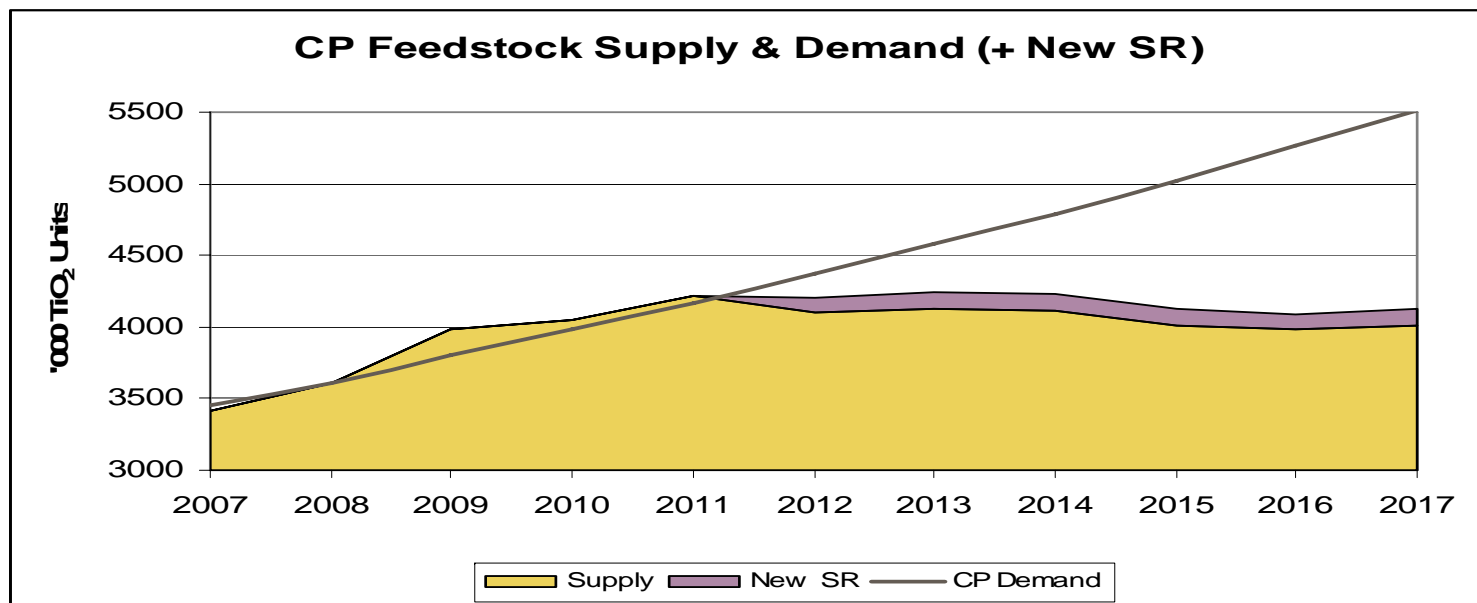
Most projects face significant technological/economical/quality challenges



## Deficit to be filled by Synthetic Rutile?

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- Very few SR quality ilmenite resources available
- Declining SR production from WA:
  - Chandala volume to be used at Kwinana
  - South West Australia scaling down
- Potential SR projects includes Tata, production unlikely within the next 3- 4 years (land access issues)



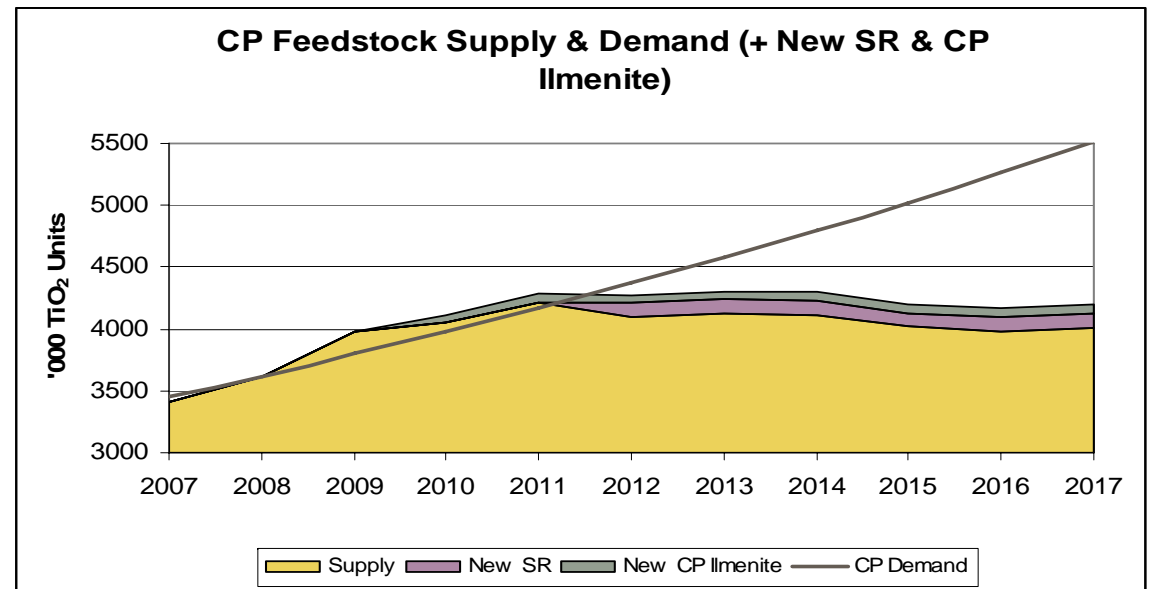
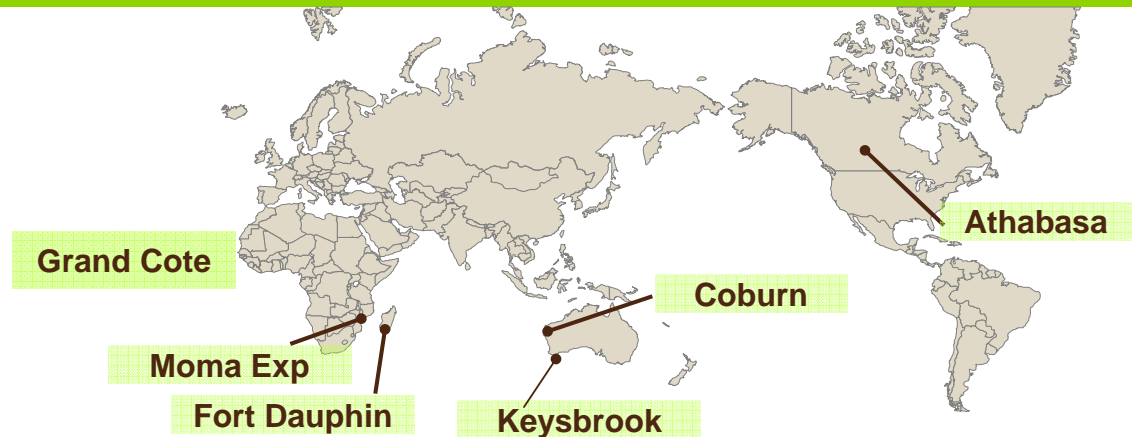
Unlikely that gap will be filled by new SR production



## Deficit to be filled by CP ilmenite?

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- Ilmenite with  $\text{TiO}_2$  content > 60%
- Dwindling production from existing producers
- Insufficient tonnage from new projects
- “2<sup>nd</sup> generation resources” (small resource, no infrastructure, high in U+Th, P, Cr, fines)
- High freight rates
- Competition from SR producers
- High levels of waste for chlorinators
- Economies of scale an imperative



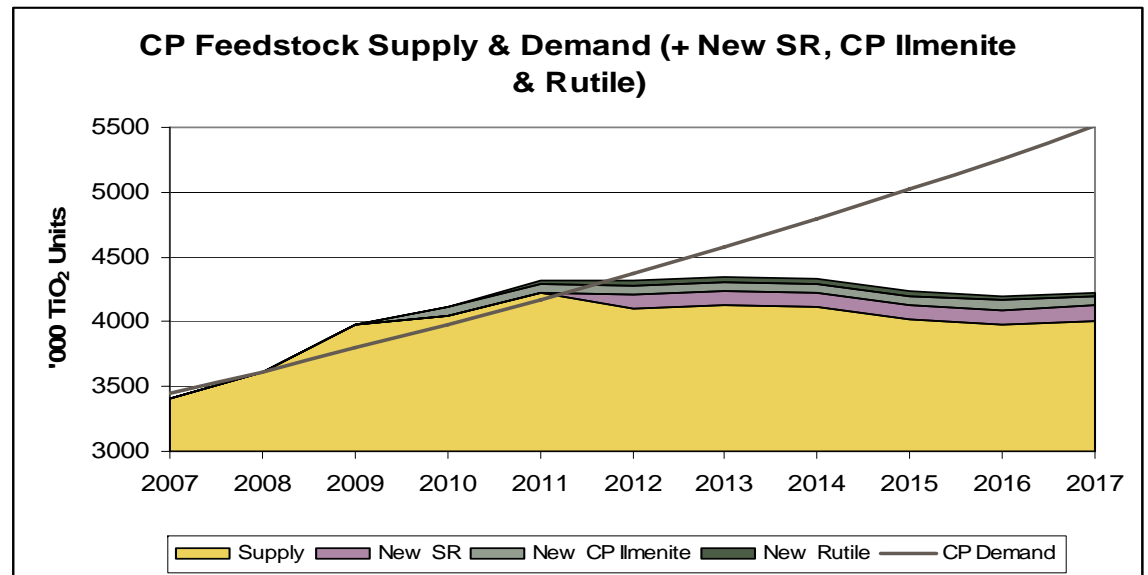
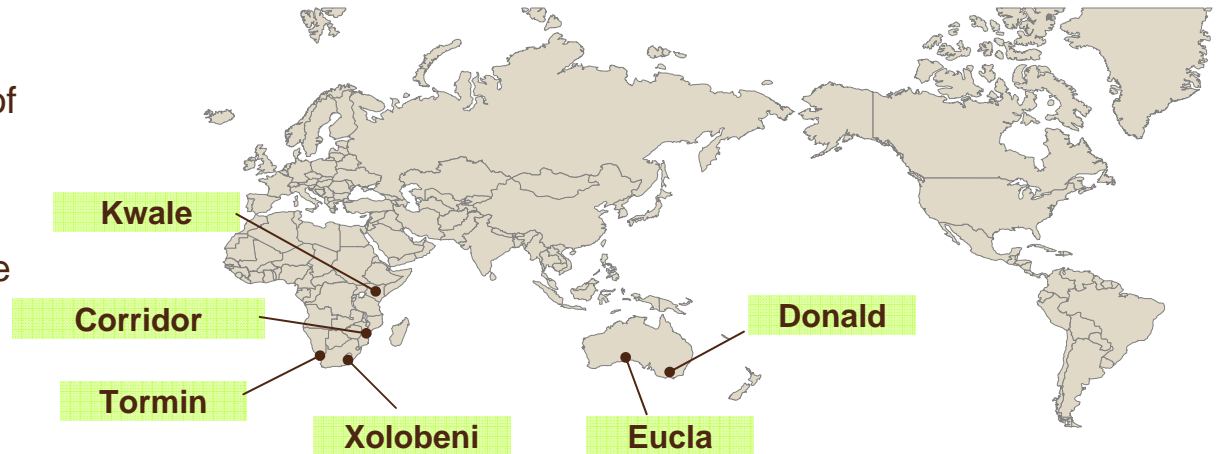
Highly unlikely, if not impossible



## Deficit to be filled by rutile?

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- New projects have small quantities of rutile
- Availability directly related to ilmenite and zircon economies of scale
- Deficit will be marginally reduced by new rutile projects
- Many projects unlikely to succeed
- Strong competition from:
  - Welding industry
  - Titanium sponge industry



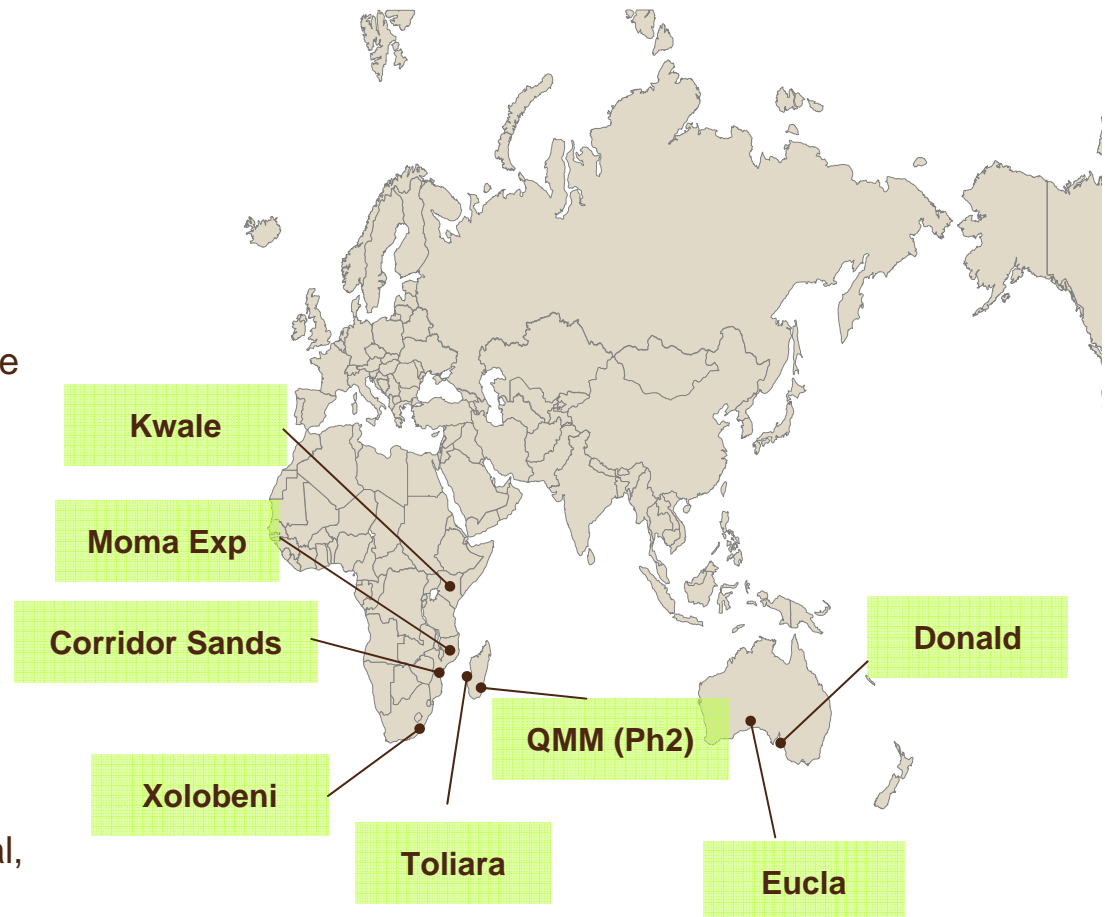
Rutile will fill a small gap in supply



## Deficit to be filled by SP ilmenite?

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- Ilmenite with  $\text{TiO}_2$  content < 60%
- Most new projects are SP ilmenite focused
- Most CP pigment producers would require upgraded ilmenite
- Process options:
  - Synthetic Rutile kilns
  - $\text{TiO}_2$  slag production
- Several issues to be addressed on capital, quality, costs and economies of scale



Yes, the resources are available, but could they be developed economically?



Supply/Demand of high grade feedstock

How will future supply/demand gap be filled?

**Barriers to entry in slag production**

Conclusion





## Slag technology barriers to entry

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- Access to furnace technology of slag manufacturing



Significant barriers to entry



## Access to furnace technology of slag manufacturing<sup>14</sup>

	Capacity	Technology
<b>Rio Tinto (BHPP)</b>		
- RBM	927 ktpa CP	4 x Electric Furnaces (AC)
- QIT	375 ktpa CP (UGS)	8 x Electric Furnaces (AC)
<b>Exxaro</b>		
- KZN Sands	187 ktpa CP	2 x Electric Furnaces (DC)
- Namakwa Sands	178 ktpa CP	2 x Electric Furnaces (DC)

- Technology available to only two companies in a small industry
- Based in countries with relatively low energy costs
- Various small furnaces in China producing CP slag for local consumption
- Construction of Chinese furnace for China Yunnan Metallurgical Group (110 ktpa slag capacity)



CP slag capability in the hands of two companies



## Slag technology barriers to entry

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- Access to furnace technology of slag manufacturing
- Complex metallurgical process and equipment resulting in long ramp up periods

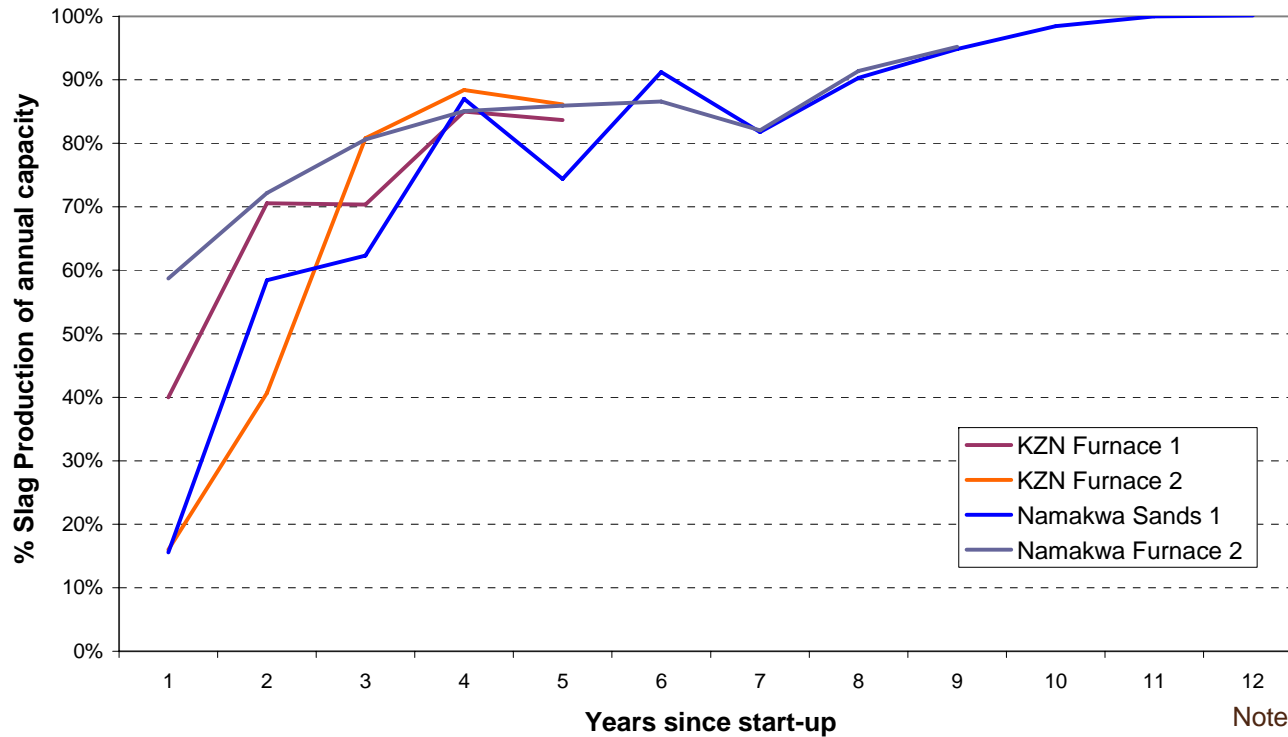


Significant barriers to entry



# Furnace ramp-up

DC Furnaces Ramp up Performance



Note: Adjusted to eliminate the impact of relines

- 85% of cold feed capacity reached after 4 years.
- Longer than expected ramp-up curves.
- Impact of earlier piloting work.



Very long ramp-up curves



## Slag technology barriers to entry

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- Access to furnace technology of slag manufacturing
- Complex metallurgical process and equipment resulting in long ramp up periods
- Long development phase which requires significant resources (money, people, time)



Significant barriers to entry



## Long development phase

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Iskor's (Now Exxaro) investment in furnace process development:

- 11 Campaigns on pilot plant (1.5 MW)
- Longest campaign – 6 weeks
- Training of personnel
- Process development over a period of 7 years, started 5 years prior to operations
- In-house R&D facilities imperative



Very extensive and expensive R&D imperative



## Slag technology barriers to entry

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- Access to furnace technology of slag manufacturing
- Complex metallurgical process and equipment resulting in long ramp up periods
- Long development phase which requires significant resources (money, people, time)
- **Technical challenges**



Significant barriers to entry



## Technical challenges for slag smelting

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Challenge	Issues
Furnace feedstock characterisation	<ul style="list-style-type: none"><li>• Mineralogy of ilmenite must be understood to clean from U+Th, P, Cr, etc.</li><li>• Reductant characterisation</li></ul>
Decrease electricity costs and reductants	<ul style="list-style-type: none"><li>• Optimal use of electricity and reductant</li><li>• Energy efficiencies</li><li>• Process solutions such as pre-heating and pre-reduction</li></ul>
Utilisation	Reduce routine maintenance tasks on: <ul style="list-style-type: none"><li>• Electrode additioning</li><li>• High refractory wear areas</li></ul>
Product requirements	<ul style="list-style-type: none"><li>• Higher TiO<sub>2</sub> levels (waste at CP plant)</li><li>• Lower U+Th levels</li></ul>



Significant technical challenges still exist for DC ilmenite smelting



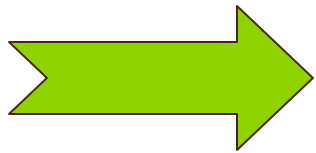
## Slag technology barriers to entry

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- Access to furnace technology of slag manufacturing
- Complex metallurgical process and equipment resulting in long ramp up periods
- Long development phase which requires significant resources (money, people, time)
- Technical challenges
- Profitability of producers



Significant barriers to entry



**Feedstock producers and pigment producers need price increases to survive**



**Exxaro Sands is committed to the Mineral Sands industry, however, SUBSTANTIAL price corrections need to take place**



**The pigment industry and feedstock producers need discipline and patience to secure announced price increases**



**Someone is making money in this industry and it isn't us!!!**

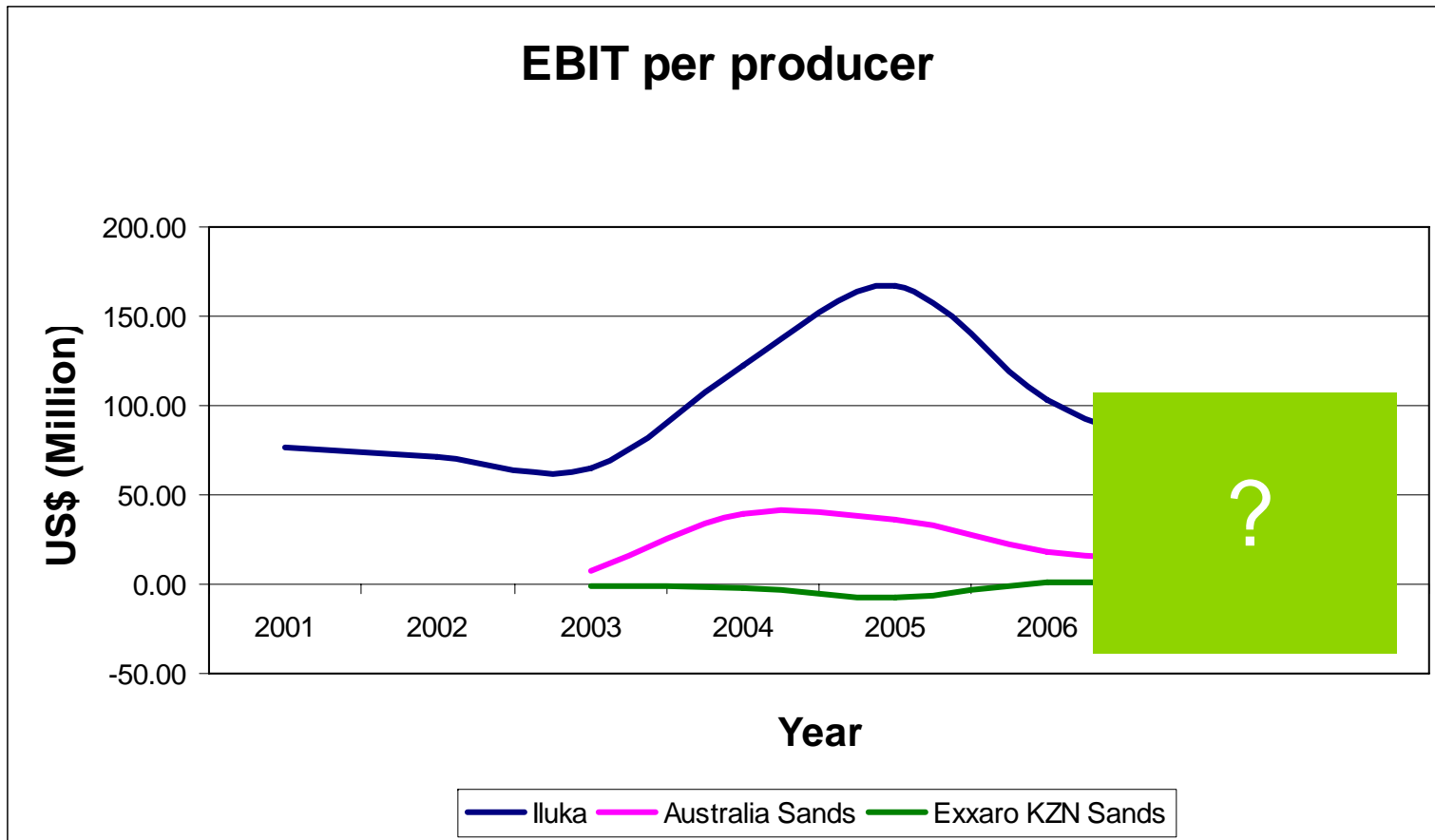


**Profitability of feedstock and pigment producers are under severe pressure**



# Profitability of feedstock producers – November 2007

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Source : Exxaro Sands, Iluka's Annual Reports

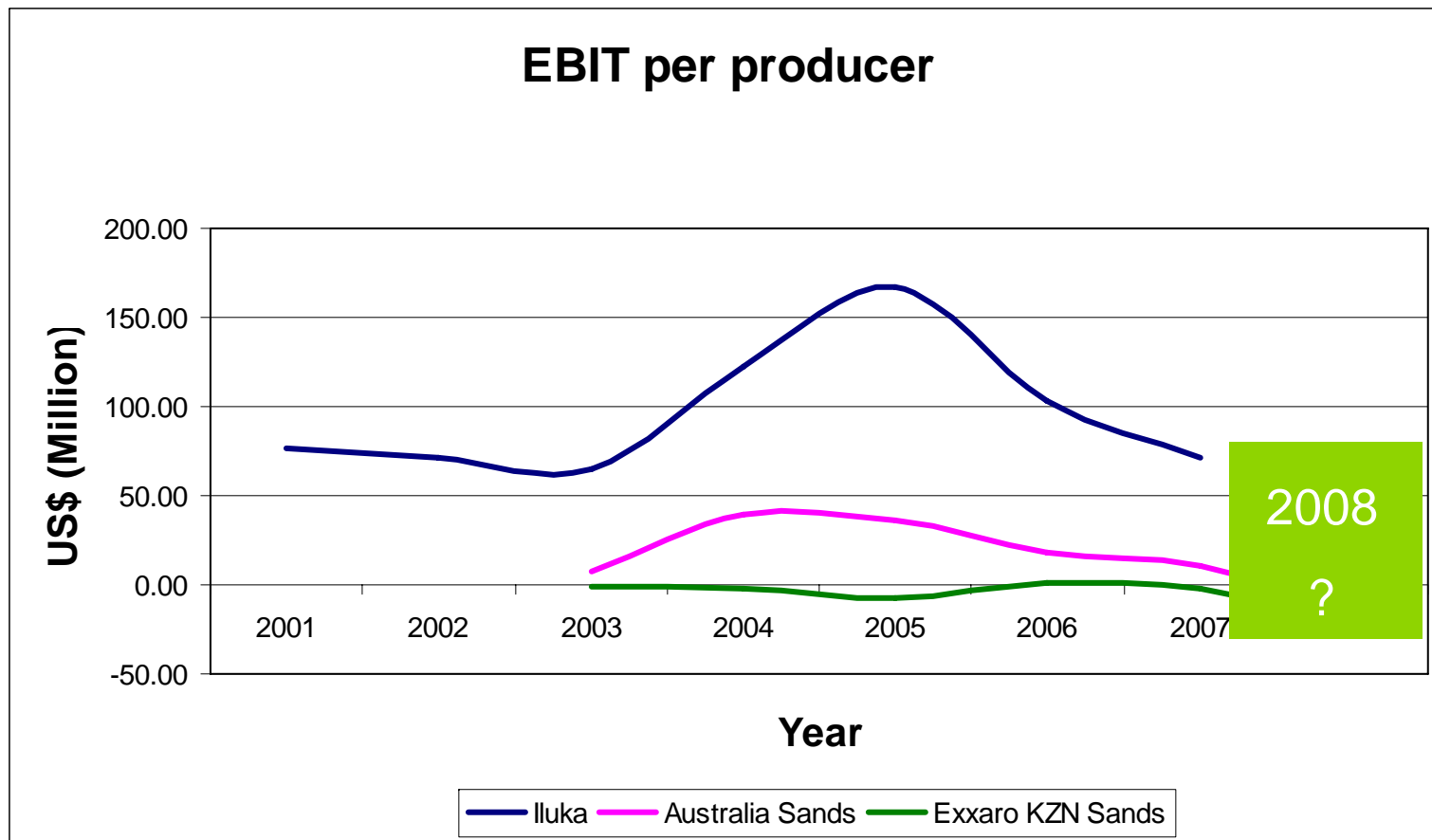


Expected decline in profitability of major feedstock producers



## Profitability of feedstock producers

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Source : Exxaro Sands, Iluka's Annual Reports

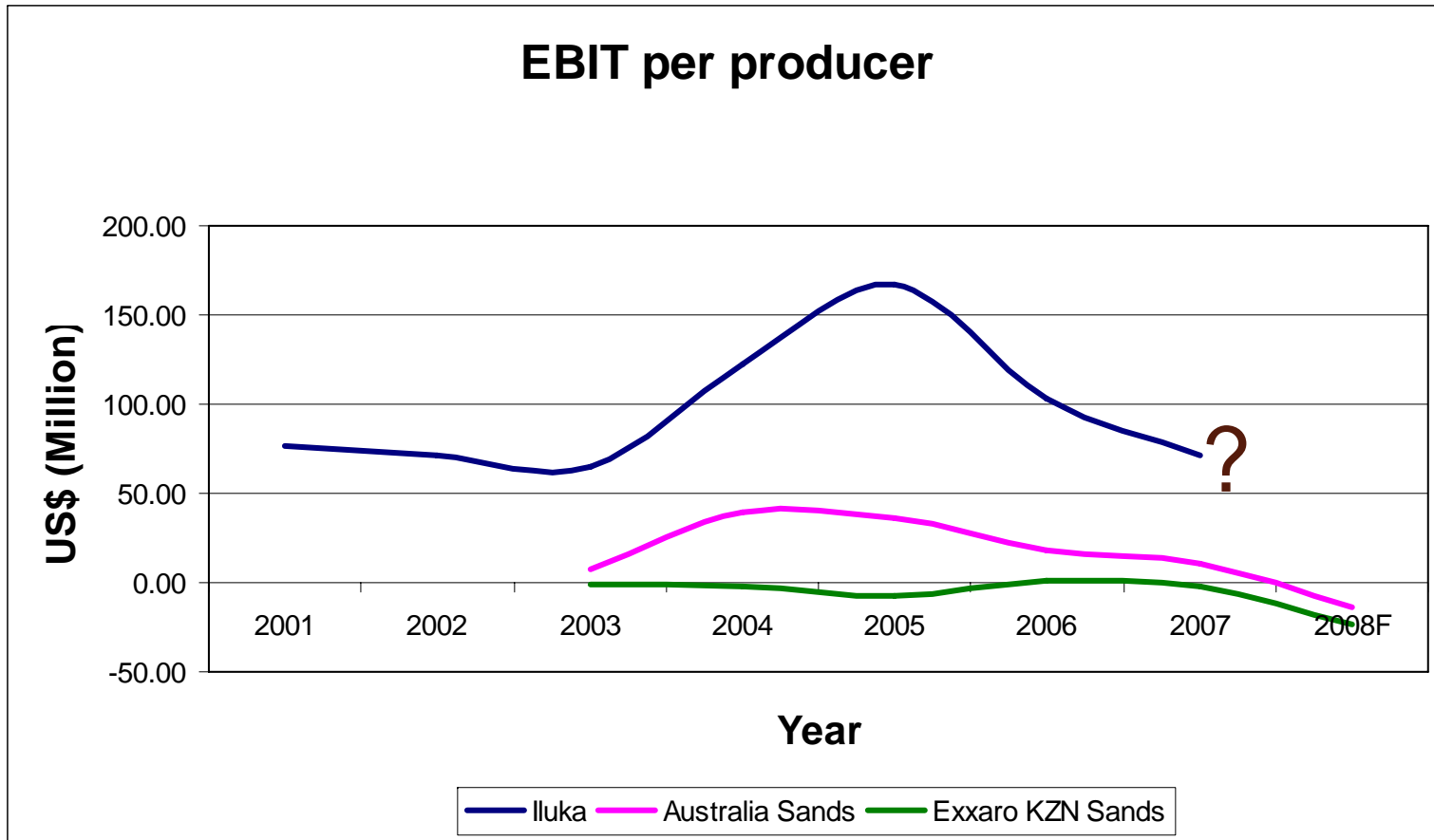


Marked decline in profitability of major feedstock producers materialised



## Profitability of feedstock producers

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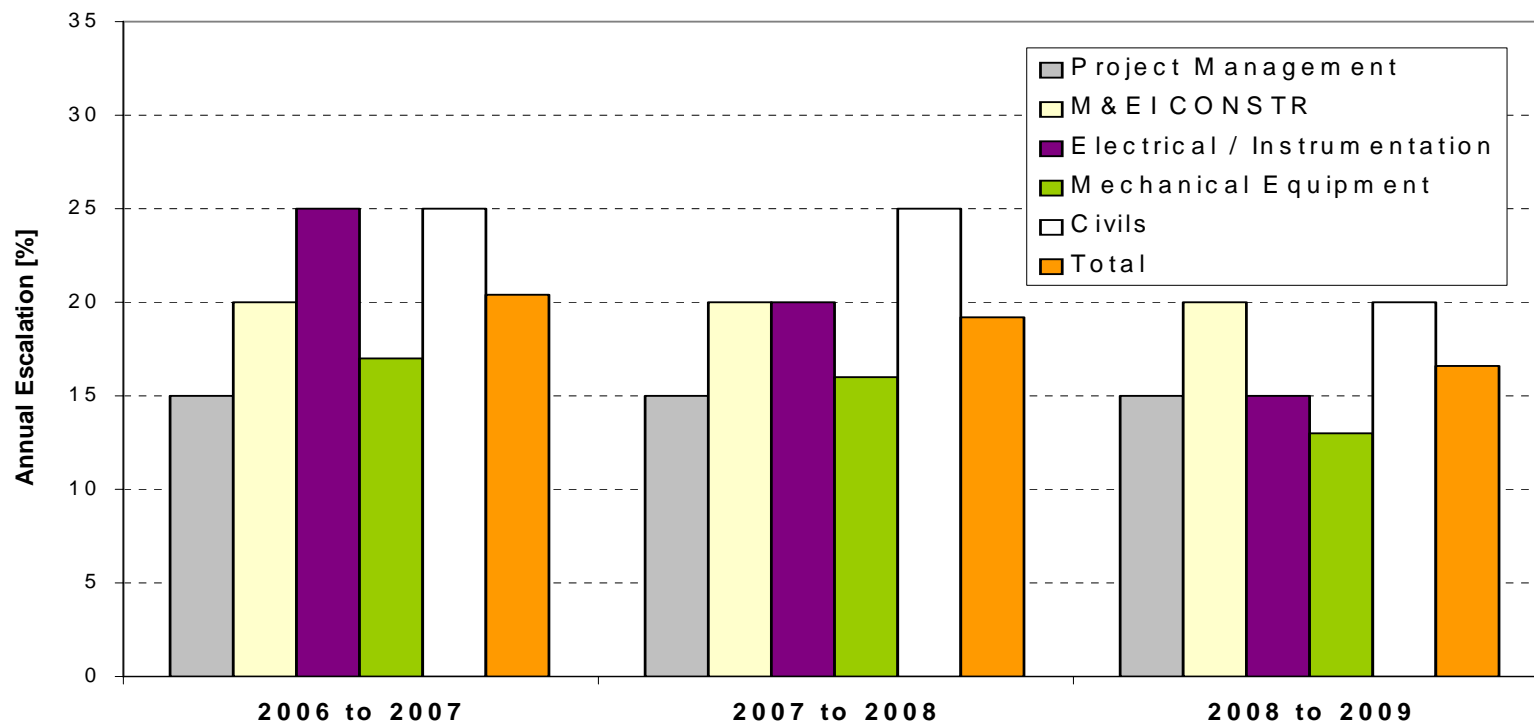
Source : Exxaro Sands, Iluka's Annual Reports



Marked decline in profitability of major feedstock producers



### Increase in South African Project Costs



Source: Du Plessis, M.: Exxaro Technology

**“QIT Madagascar Minerals (QMM) has revised its budget for its ilmenite project from US\$780 million to about US\$1 billion due to escalating construction prices.”**

*Reuters News, 19 February 2008*

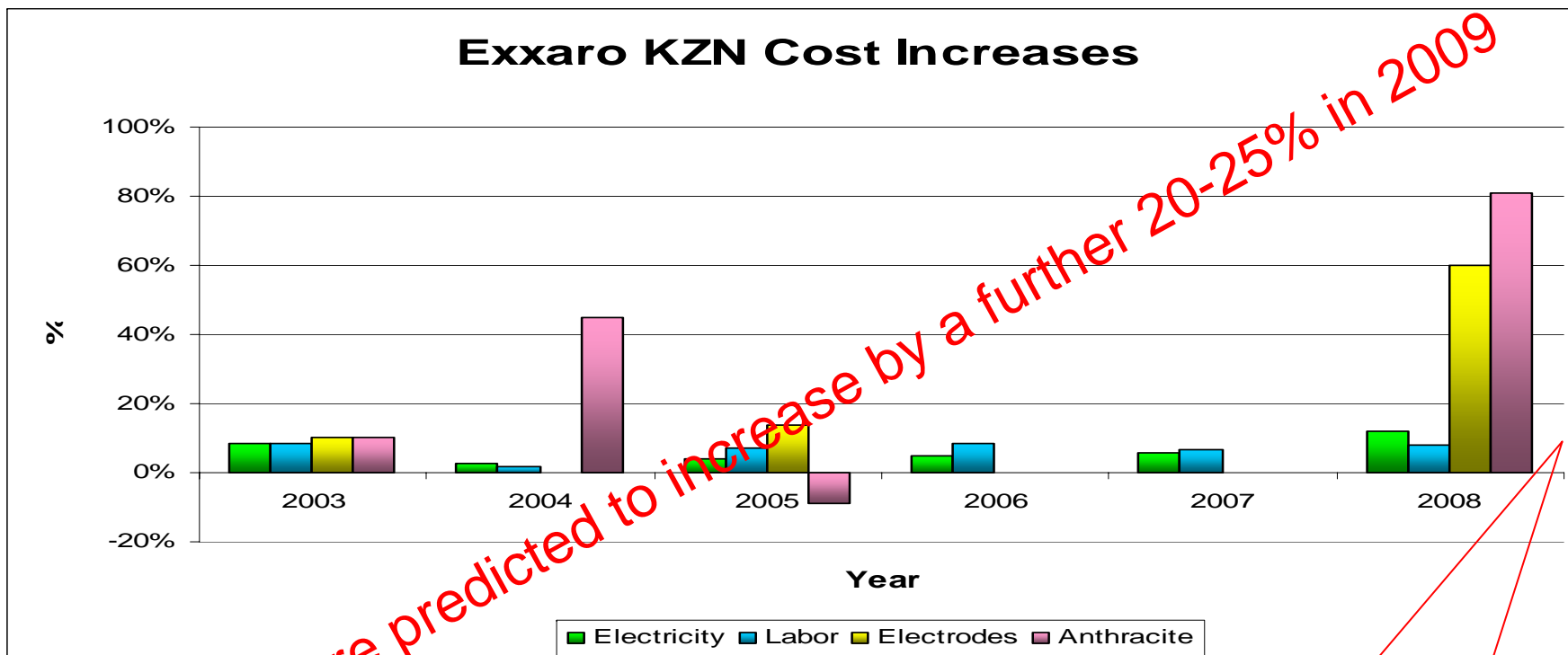


Significant increase in the capital cost of projects



## Increase in variable costs

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Costs as % of total costs:

- Labour – 21%
- Electricity – 10%
- Electrodes – 5%
- Anthracite – 5%

#### **Predicted increases in 2009**

- Labour – CPIX = >10%
- Electricity – 60%
- Electrodes – 90%
- Anthracite – 90%








**This implies price increases of >20% to eliminate cost increase**



## Profitability of pigment producers

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	2007 vs 2006
Tronox	
Huntsman	
Kronos	
Kemira	
DuPont	

Source: Company annual reports/websites/Segment profit where applicable



Marked decline in profitability of major pigment producers



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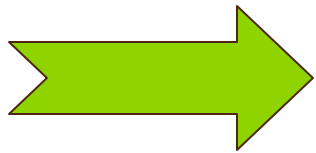
**Conclusion**





## Conclusion

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**High grade feedstock shortage a very real possibility**



**The gap could be filled with chloride slag/UGS but major challenges to overcome**



**Significant price increases imperative for survival as a sustainable industry**



**Someone is making money in this industry and it isn't us...**





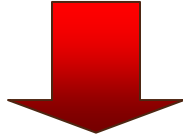


**Profitability of industry is under severe pressure and may lead to undersupply**



## Profitability of paint producers

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	2007 vs 2006
Akzo Nobel	
PPG Industries	
Jotun	
Sherwin Williams	
BASF	

Source: Company annual reports/websites/Segment data where applicable



Increase in profitability of paint producers