



Capital Markets Day

November 2008

Zinc smelter revenue stream

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BOLIDEN

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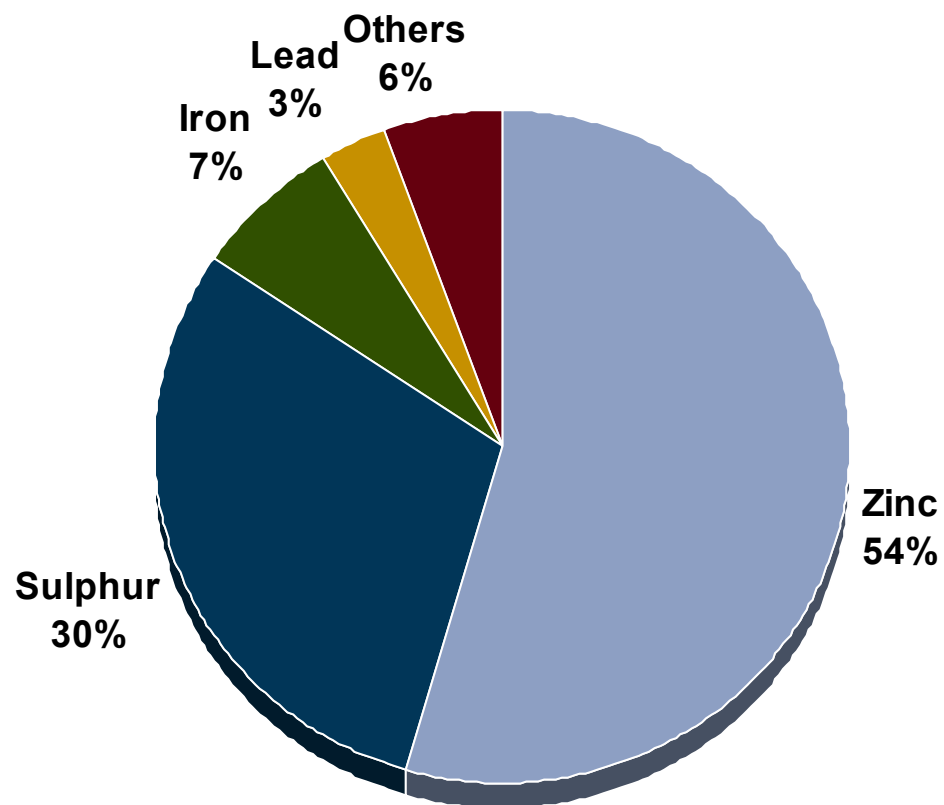
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1. Important information

This presentation contains examples of common calculations that can be used to model the businesses in which Boliden operates.

All concentrate specification and contract terms presented here are hypothetical and are used to illustrate the relevant calculations.

2. Zinc concentrates – examples of content



3. Pricing of zinc concentrates

The price of the raw materials shall be **the sum of the values of the payable metals** less the sum of the deductions.

In general smelting business consists of the following gross profit elements:

- Treatment Charge (TC)
 - Base TC
 - Price Escalators
- Free metal
- By-products
- Metal premiums

3.1 Typical pricing clause – Zinc

The price of the raw materials shall be **the sum of the values of the payable metals** less the sum of the deductions.

Buyer shall pay for 85% of the final agreed zinc content, subject to a minimum deduction of 8%-units at the official LME Zinc (SHG) settlement quotation averaged over the quotation period.

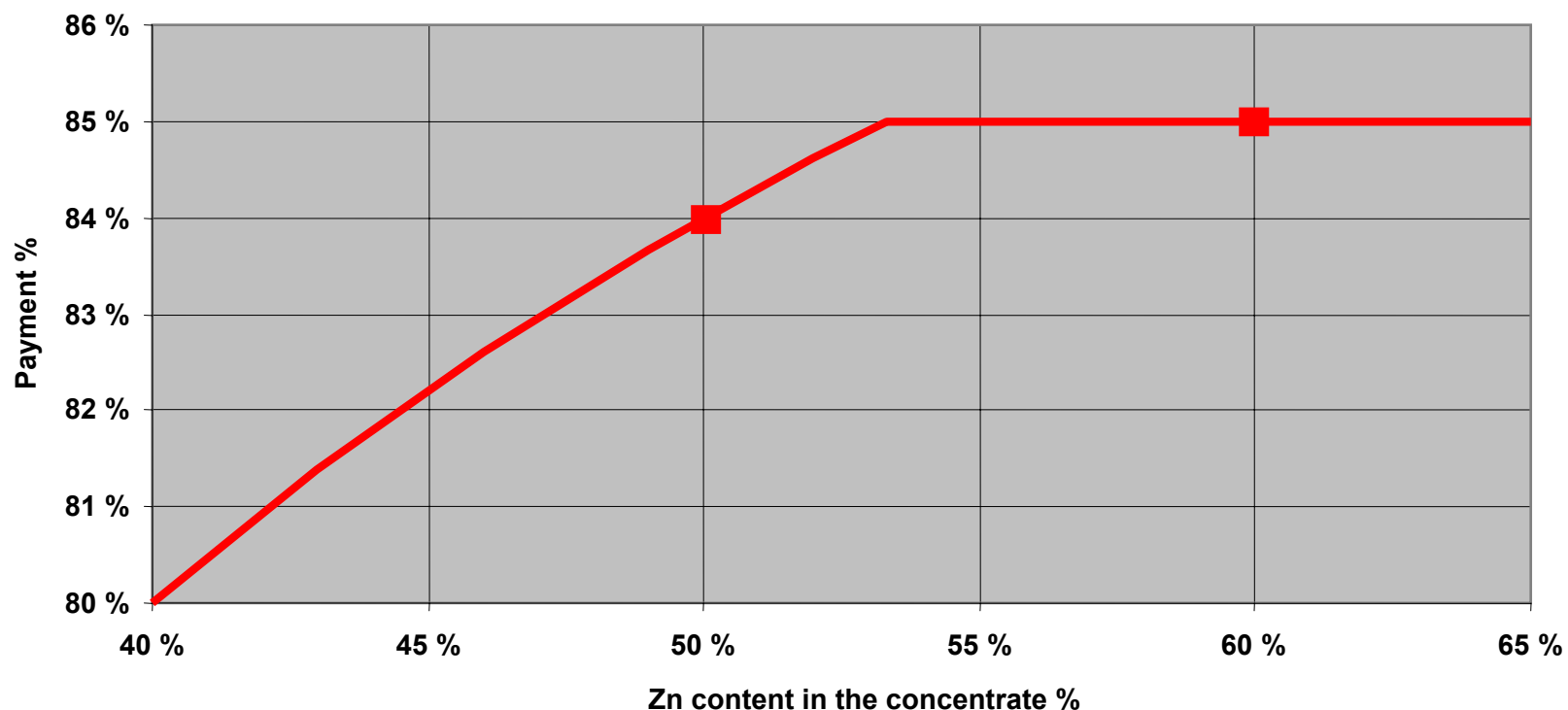
Example) A concentrate with a zinc content of 60% the deduction is 9% ($60\% \times 85\% = 51\%$ i.e. $60\% - 51\% = 9\% > 8\%$). Payable metal value:

$$\mathbf{60\%-Zn \times 85\% \times 2,000 \text{ USD/t-Zn} = 1,020 \text{ USD/MT}}$$

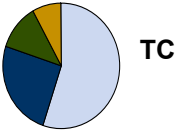
Example) For a concentrate with a zinc content of 50% the deduction is 8% ($50\% \times 85\% = 42.5\%$ i.e. $50\% - 42.5\% = 7.5\% < 8\%$). Payable metal value:

$$\mathbf{50\% - 8\%-units = 42\% \times 2,000 \text{ USD/t-Zn} = 840 \text{ USD/DMT}}$$

3.1 Typical pricing clause – Zinc



- Minimum deduction mechanism compensates smelters for processing low grade concentrates.



3.2 Deductions – Treatment Charge (TC)

The price of the raw materials shall be the sum of the values of the payable metals less **the sum of the deductions**.

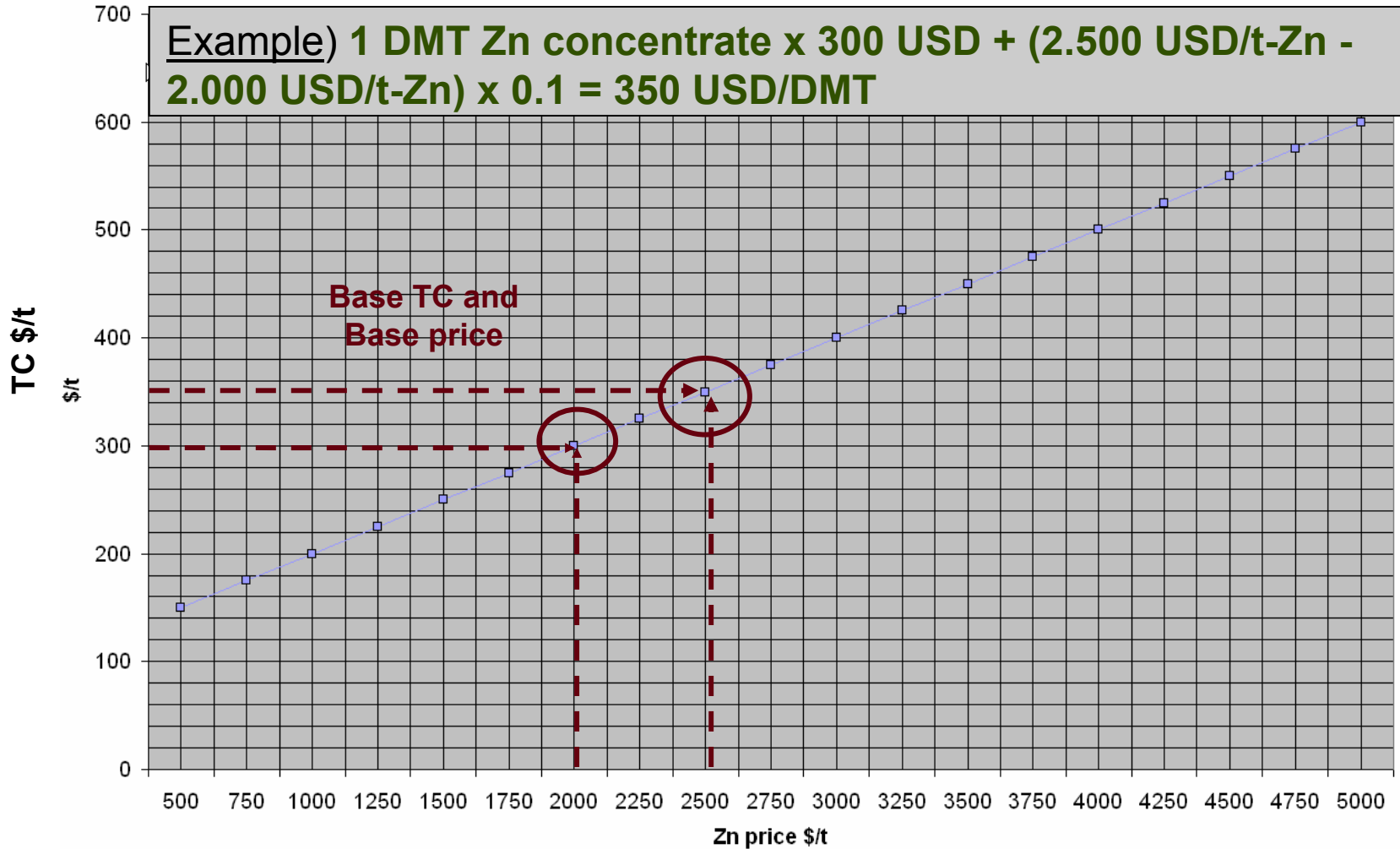
Base Treatment Charge (TC) for zinc shall be 300 USD per DMT of concentrates based on zinc price of 2,000 USD per metric tonne.

Price Escalators mean that the TC shall be increased/decreased by +/-0.1 USD per DMT for each 1 USD/t Zn variation in the zinc price above/below base price 2,000 USD per metric tonne. Variable escalators/de-escalators and flat areas are also applied in some years.

These terms are normally expressed \$ 300/2,000/+0.1/-0.1.

Base TC, base price and price escalators are negotiated annually between miners and smelters. Typically negotiations start in October and continue well into the following year. Benchmark terms are normally established when the major mines and smelters have agreed the annual terms.

3.2 Deductions – Treatment Charge (TC)



3.3 Deductions – Penalties

The price of the raw materials shall be the sum of the values of the payable metals less **the sum of the deductions**.

For instance, a iron penalty means that for each 1.0%-units by which the final iron assay exceeds 8.00%, seller shall pay a penalty charge of 2.00 USD per DMT of concentrates, fractions pro rata.

Example: A final iron assay of 10.00%, i.e. 2%-units over 8.00%:

$$2 \times 2.00 \text{ USD/DMT} = 4.00 \text{ USD/DMT}$$

Penalty clauses are typically applied for the impurities harmful to zinc smelting process.

4. Pricing of secondary raw materials

- In addition to zinc concentrates, zinc oxides can be used as part of the raw material mix at a zinc smelter.
- Zinc oxides for example includes:
 - Zinc clinker
 - Waelz oxides
- The commercial terms for these materials are usually similar to zinc concentrates.

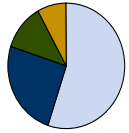
5. Free metal

The value of the free zinc in zinc concentrates for a zinc smelter is **depending on recovery rate and LME zinc price.**

The typical recovery rate for a zinc smelter is 95.5%.

Example) Value of Free Zinc = Zn content x (Recovery% - Payable Zinc%) x LME price:

$$54.5\% \times (95.5\% - 85\%) \times 2,500 \text{ USD/t-Zn} = 143.1 \text{ USD/DMT}$$

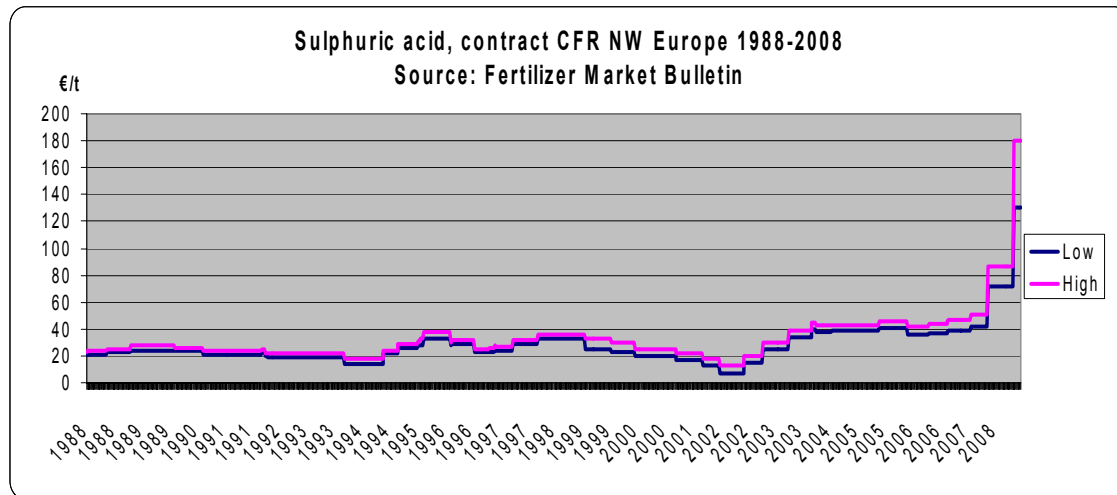


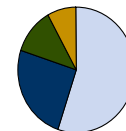
6. By-product credits

- Main by-product for a zinc smelter is sulphuric acid (H₂SO₄)

Example) Value of Sulphur (rule of thumb)= 1 DMT of Zn concentrate with 30% of sulphur gives approximately 1 ton of sulphuric acid (H₂SO₄) depending on recovery rate. Typical recovery rate is 95% in a Zn smelter.

$$1 \text{ DMT Zn concentrate (30\%S)} \times (98/32) \times 95\% \Rightarrow 0.873 \text{ ton H}_2\text{SO}_4 \\ \times 75 \text{ USD/t} = 65.5 \text{ USD/DMT}$$



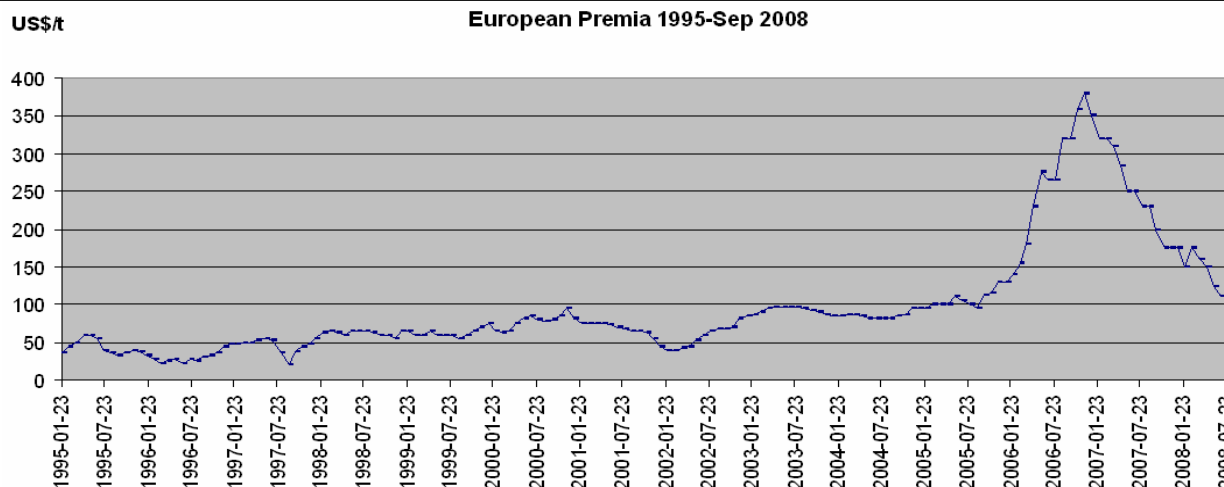


7. Metal premiums

- The value of metal premium depends on:
 - Demand/supply situation
 - The product (quality/alloys)
 - The amount of value added in customer service functions

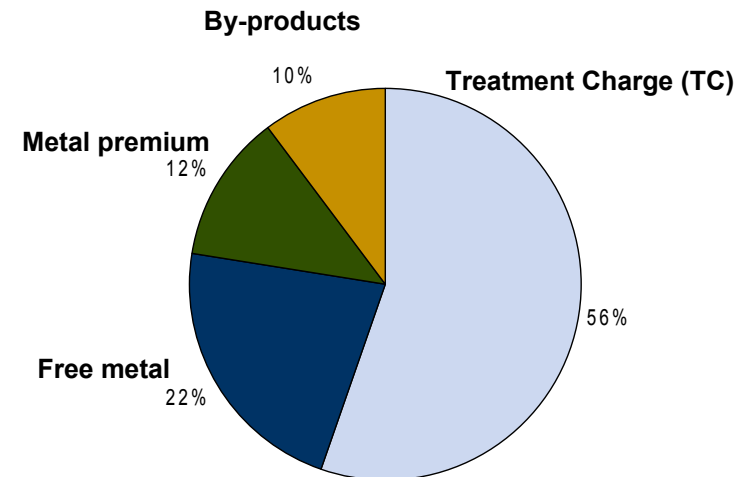
Example) Value of metal premium = Metal ton x Zn content x recovery rate x premium/USD

1 MT Zn metal x 54.5% x 95.5% x 150USD/t= 78.1 USD/DMT



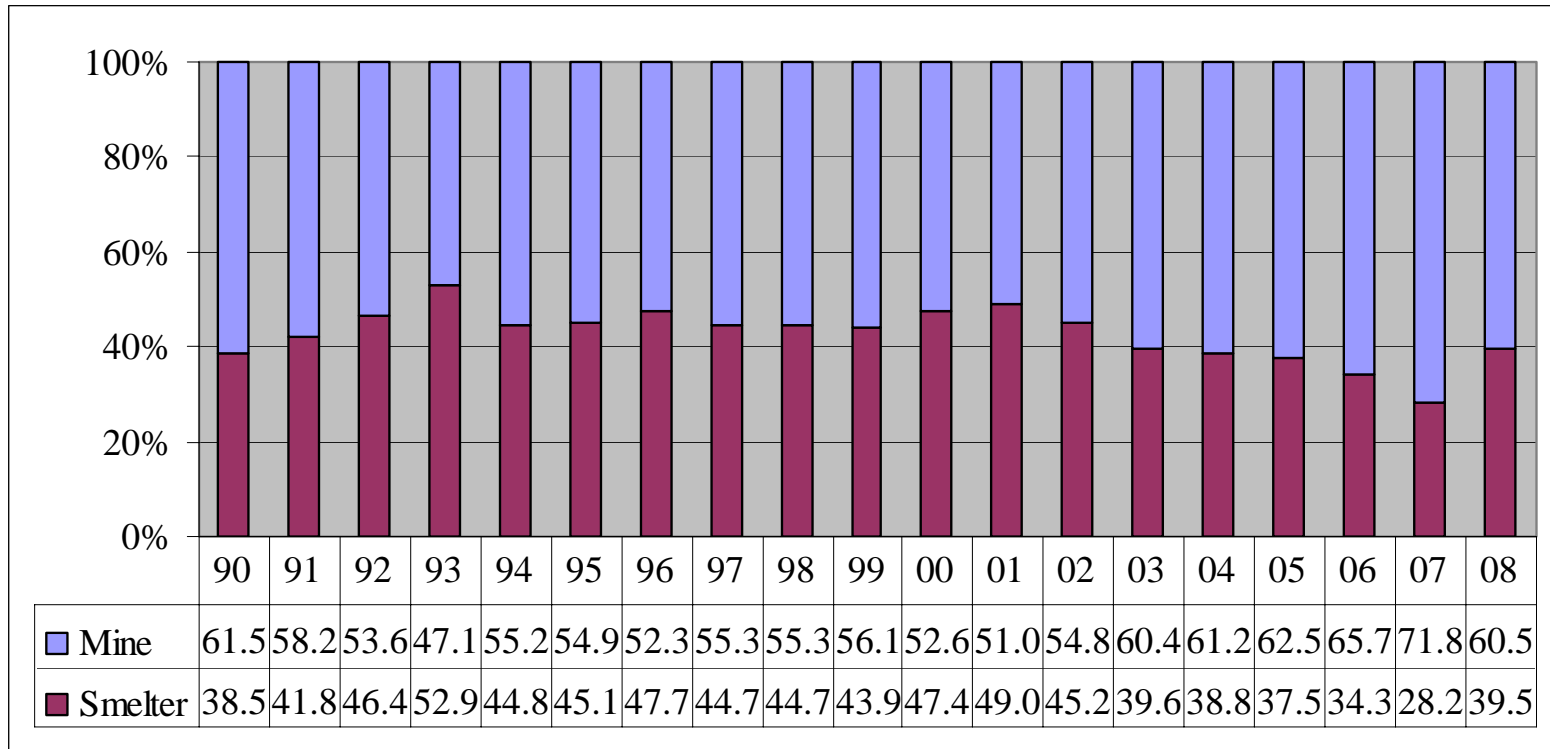
8. Putting Zinc smelters' revenues together

Treatment Charge (TC)	USD/DMT	Share
TC:1 DMT Zn concentrate x 300 USD=	300	
Esc: (2,500 USD/t Zn-2,000 USD/t Zn) x 0.1=	50	
Fe penalty:2 x 2.00 USD/DMT =	4	
Sum TC	354	56%
Free metal		
Free Zn metal: 54.5% x (95.5% - 85%) x 2,500 USD/t-Zn	143.1	
Sum Free metal	143.1	22%
By-products		
H2SO4: DMT Zn concentrate (30%S) x (98/32) x 98% =		
0.882 ton H2SO4 x 75 USD/t	65.5	
Sum By-product	65.5	10%
Metal premium		
Zn premium: 1 MT Zn metal x 54.5%x 95.5% x 150USD/t	78.1	
Sum Metal premium	78.1	12%
Sum Raw Material revenue	641.4	100%



9. Share of raw material value

- Smelters share referred here consists of the realised TC and the free zinc contribution



Source: Brook Hunt

Note: 2008 figures have been calculated using YTD Zn price on Sep 30th 2008



10. Business cycle of metals

