

# Introduction to Zinc and Lead Smelting Business



25 November 2009

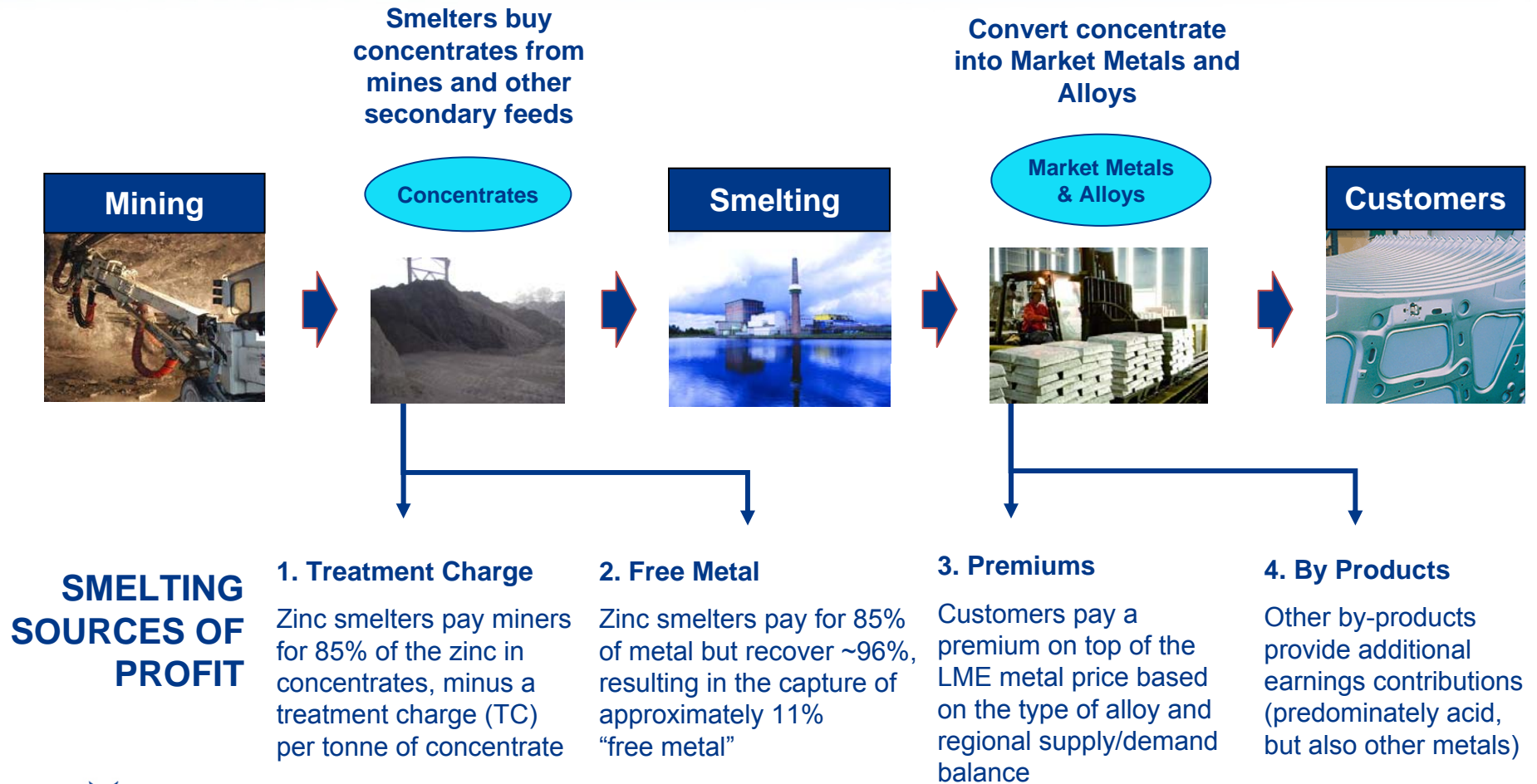
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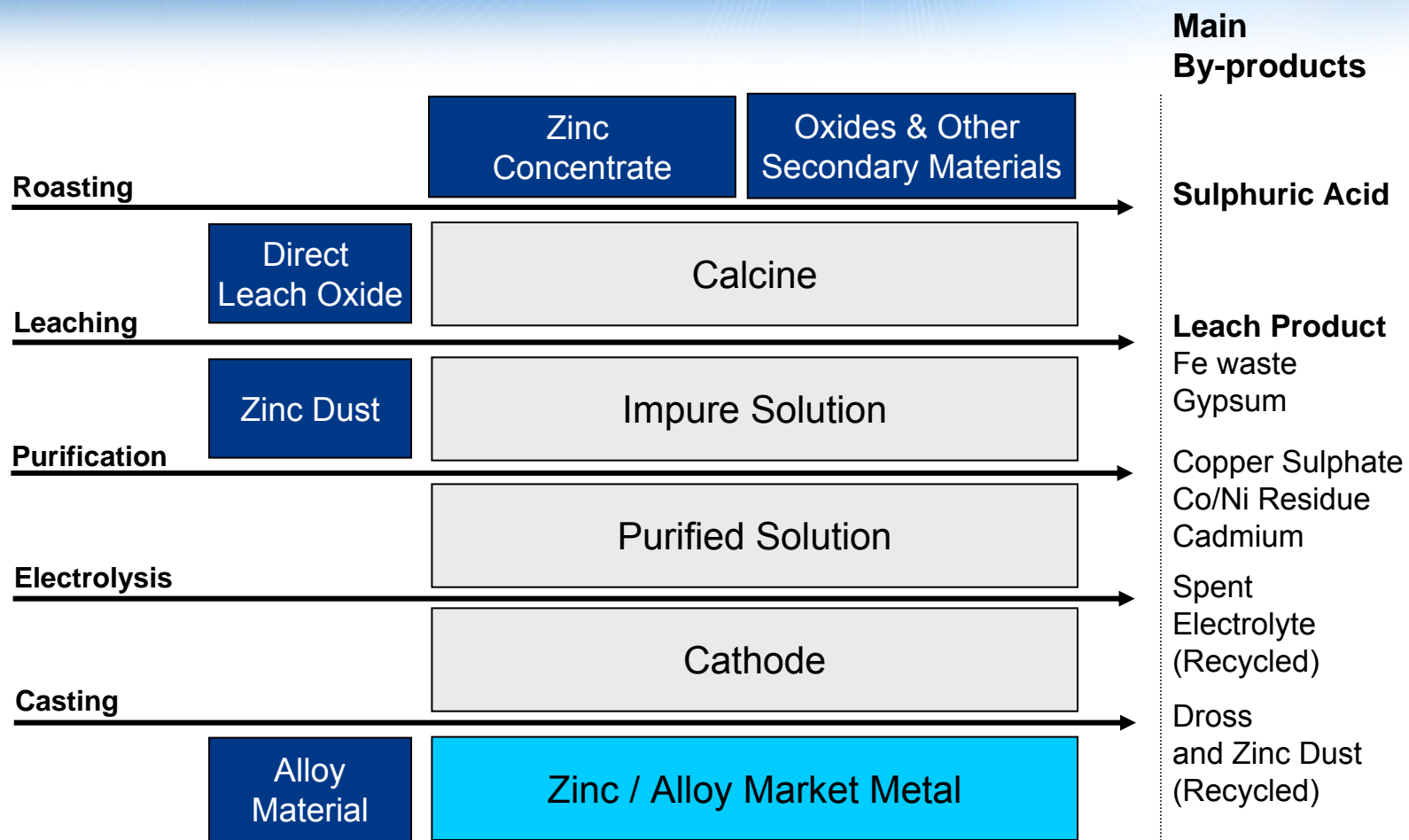
# Important Information

- This presentation provides an overview of the zinc and lead smelting business
- Data used in these calculations is based on industry benchmarks and historic data all of which is publicly available
- Worked examples do not reflect the terms of any individual contract that Nyrstar has previously entered into, currently trades on or is likely to enter into in the future

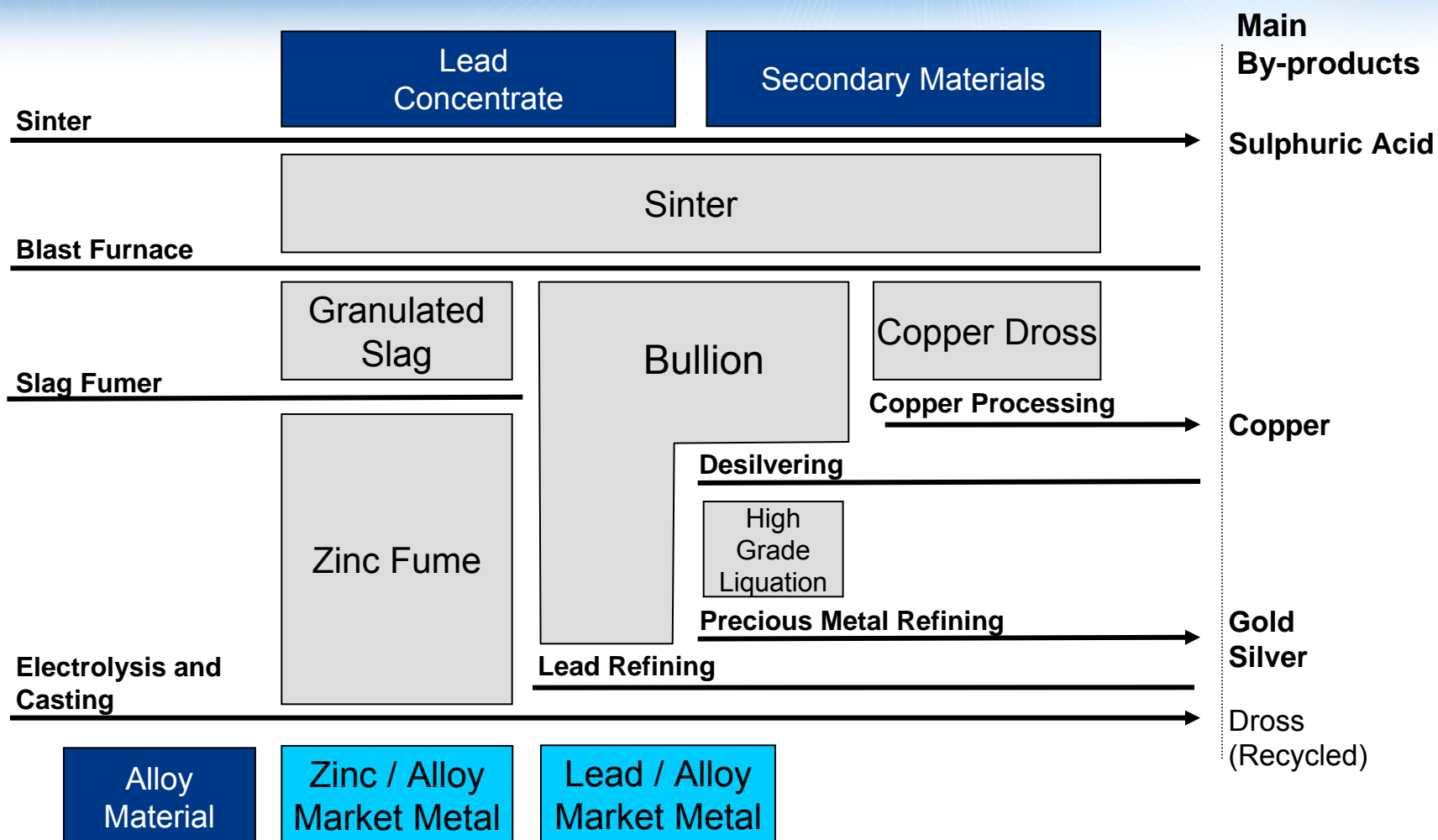
# Zinc smelting: sources of profit



# Zinc Smelting Process



# Lead Smelting Process



# Zinc and Lead Concentrate

## Typical Pricing Terms

### Zinc Concentrate

- Zn Metal Paid 85%

*Zinc Smelters typically pay for 85% of the zinc contained in zinc concentrates (typically 54% Zn) valued at LME price averaged over the Quotation Period (QP)*

*In addition will pay for Ag content in concentrate if it exceeds certain threshold*

#### Deductions

- Treatment Charges
- Penalties<sup>#</sup> and/or Allowances

*<sup>#</sup> Penalties depend on quality of concentrate e.g. where the material contains impurities above the set thresholds the smelter is compensated*

### Lead Concentrate

- Pb Metal Paid 95%

*Lead Smelters typically pay for 95% of the lead contained in the lead concentrate (typically 60% Pb) valued at LME price averaged over QP*

*In addition Lead Smelter will pay for Ag, Au, Cu and Zn content in concentrate if it exceeds certain thresholds*

#### Deductions

- Treatment Charges
- Penalties and/or Allowances

# Profit Share Concept

- The metal value contained in zinc concentrates is shared between miners and smelters through payable metal and Treatment Charges (TCs), as zinc smelters only pay for 85% of contained metal, minus a treatment charge

- Industry players often refer to the concept of profit sharing, which refers to the proportion of the LME metal price attributed to smelters and miners

- Smelters' share of LME price between 1986–2009\*

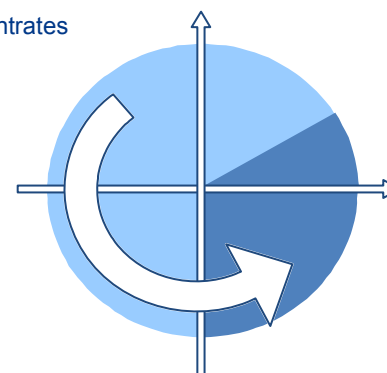
- Average 40%
- Maximum 54% (1986)
- Minimum 28% (2007)

\* Source : Brook Hunt



## Treatment charge

- Surplus metal and concentrates
- LME price falls
- Mines cut production



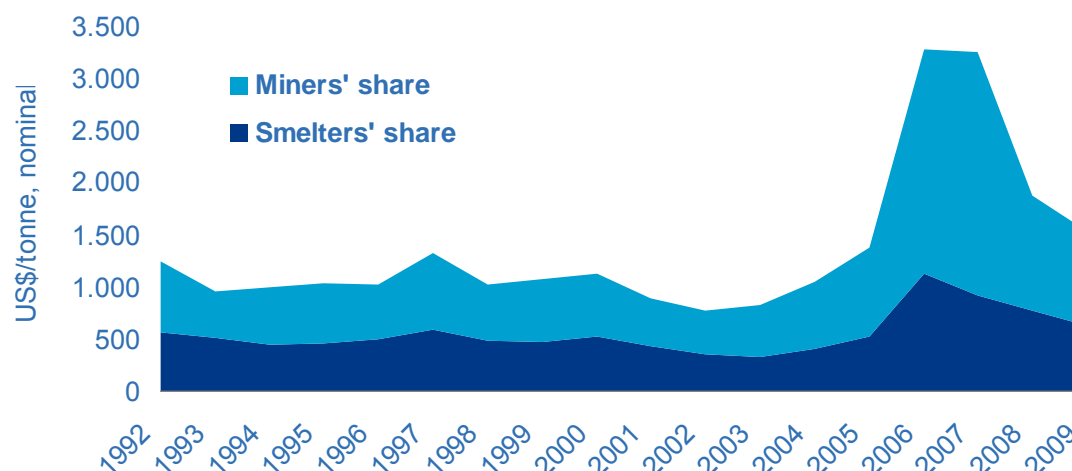
- Concentrates draw down
- Power shifts to miners
- TCs fall

- Concentrate surplus
- Power shifts to smelters
- TCs increase
- Smelters increase production

## Metal price

- Metals draw down
- LME price increases
- Miners increase production

## Revenue sharing of zinc price



Zinc smelters capture approximately 40% of price through Treatment Charges and Free Metal

# Gross Profit

Gross profit is used to model the smelting business – therefore revenue and cost of goods sold need not be analysed separately

The table below maps revenue and COGS to the “elements” of gross profit

Revenue and Costs	Gross Profit
Metal Revenue	Free Metal 2
Premium	Premium 3
By Products	By Products 4
Realisation Expenses	
<i>Net Revenue</i>	
(Payable Metal)	
Treatment Charge	Treatment Charge 1
(Other)	(Other) 5
<i>(Net COGS)</i>	
<b>Gross Profit</b>	<b>Gross Profit</b>

The five main elements of gross profit are:

1. Smelters pay miners for metal in concentrates, minus a **Treatment Charge (TC)**
2. Smelters recover more metal than they pay for, capturing **free metal**
3. Customers pay a **premium** on top of the LME metal price based on the type of alloy and regional supply/demand
4. Other **by-products** provide valuable earnings contributions (predominately sulphuric acid, but also other metals)
5. **Other** includes realisation expenses (e.g. alloying materials, freight) and penalties

# 1. Treatment Charges

- For zinc and lead concentrates, treatment charges are payable per tonne of concentrate (not per tonne of market metal)
- Zinc Treatment charges also include price participation, and an annual benchmark is typically negotiated between major producers with the following components:
  - Base TC                                      TC prior to application of escalator/de-escalator
  - Basis Price                                    LME Zinc price at which Base TC is set (typically LME price at negotiation)
  - Escalator                                      % increase to Base TC for each US\$ LME price increase above Basis price
  - De-escalator                                   % decrease to Base TC for each US\$ LME price decrease below Basis price
- In some years there may be a more complex structure with non participation windows, or multiple escalators/de-escalators
- Most concentrate contracts are for an annual delivered quantity (ADQ), but not all concentrate may be received in that contract period. Therefore TC terms can carry over into the following year under prior period TC terms and opening inventory will also carries these terms
- Lead Treatment charges can be either flat or have escalators / de-escalators like zinc
- Note: Lead smelters do not receive a Zinc Treatment Charge for zinc contained in lead concentrates
- *Benchmark Zinc and Lead TC terms can be found in Metal Bulletin, Brook Hunt, CRU and other industry articles*

# 1. Treatment Charges – Example

- 2009 Zinc TC Benchmark terms\*
  - Base TC 196.50 USD/dmt (dry metric tonnes)
  - Basis Price LME Zinc 1,250 \$/t
  - Escalator +13% / De-escalator -12%

LME Price (\$/t)	A	1,000	1,250	1,500	2,000	2,500
Base TC (\$/t)	B	196.50	196.50	196.50	196.50	196.50
Basis Price (\$/t)	C	1,250	1,250	1,250	1,250	1,250
Escalator	E	13%	13%	13%	13%	13%
Descalator	F	12%	12%	12%	12%	12%
<b>Realised TC (\$/t)</b>	<b>G*</b>	<b>166.50</b>	<b>196.50</b>	<b>229.00</b>	<b>294.00</b>	<b>359.00</b>

\* Nyrstar achieved a composite weighted average Base TC for all zinc bearing feed materials (materials include concentrates and secondary materials such as oxides) in 2009 of approximately US\$204/dmt at \$1,250/t

G\* If LME Price < Basis price       $B + (A - C) \times F$   
 If LME Price > Basis price       $B + (A - C) \times E$

2009 Lead benchmark terms are approximately 180 USD/t flat (i.e. no escalator or de-escalator). (Source: Brook Hunt)



Realised Lead TC (\$/t) is calculated in same way as zinc example above

# 1. Projecting Zinc Treatment Charges

- The profit share concept can also be used to forecast treatment charges going forward. The following formula (applicable to zinc in this instance):

$$\text{Percentage} = \frac{(\text{Recovery} - 85\%) / \text{Recovery} \times \text{LME} + \text{TC} / \text{Recovery} / \text{Grade}}{\text{LME}}$$

Can be rearranged to calculate the realised TC for any combination of profit-share percentage and LME price

$$\text{TC} = \text{Recovery} \times \text{Grade} \times \text{LME} \times \left( \text{Percentage} - \frac{(\text{Recovery} - 85\%)}{\text{Recovery}} \right)$$

- This ensures that forecast TC assumptions are aligned to the relevant zinc price assumption and profit share %

## 2. Free Metal Contribution

## ZINC SMELTERS

- The volume of zinc free metal produced is determined by concentrate Zn grade, amount of zinc paid for and amount of zinc recovered
- Working from input to output (assuming 54% Zn grade, 85% Zn metal paid and 96% recovery rate):
  - 1000 dmt amount of zinc concentrate we buy
  - $1000 \text{ t} \times 54\% = 540 \text{ t}$  amount of contained zinc metal
  - $540 \text{ t} \times 85\% = 459 \text{ t}$  amount we pay for
  - $540 \text{ t} \times 96\% = 518 \text{ t}$  amount we recover i.e. production volume
  - $518 \text{ t} - 459 \text{ t} = 59 \text{ t}$  therefore amount of free metal
- The contribution to gross profit from zinc free metal is determined by the recovery rate, the LME zinc price and exchange rates

$$\text{Free Metal (€)} = \text{Production} \times \left[ \frac{(\text{Recovery} - 85\%)}{\text{Recovery}} \times \frac{\text{LME}}{\text{Exchange Rate}} \right] \times \text{EUR:USD Rate}$$

- The free metal contribution has to be grossed up by the recovery rate as zinc lost in the production process has a free metal component
- Using the example above production 518t x (96% recovery - 85% payable) / recovery 96% = 59 t free metal

## 2. Free Metal Contribution

- Nyrstar's average zinc recovery in 2008 was approximately 96% (zinc smelters only)
- Example (for zinc smelters only, based on H1 2009 figures):
  - 363,000 t zinc production
  - Recovery rate – 96%
  - Avg Zinc LME price – \$1,322 / t
  - Avg Exchange Rate – EUR:USD 1.34

$$\text{Free Metal (€)} = 363,000 \times \frac{(96\% - 85\%)}{96\%} \times \frac{\$1,322}{1.34} \approx \text{€41m}$$

### LEAD SMELTER

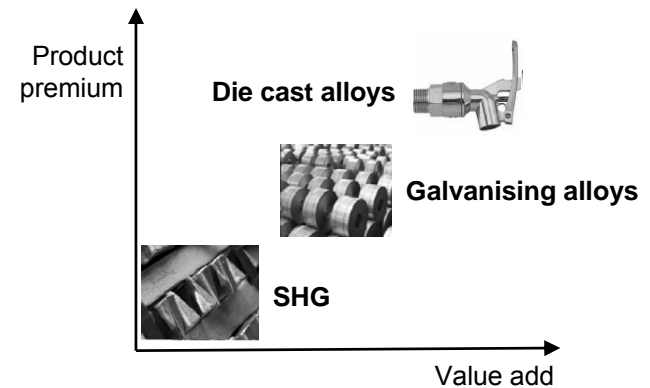
- Port Pirie recovers approximately 90% and only pays for approximately 10% of zinc in concentrates. Therefore the zinc free metal contribution needs to be calculated separately
- Lead Free Metal is calculated using the same approach but is not as significant as for zinc due to higher payable component. Payable lead 95%, lead recovery at Port Pirie 99% (2008)

# 3. Premiums

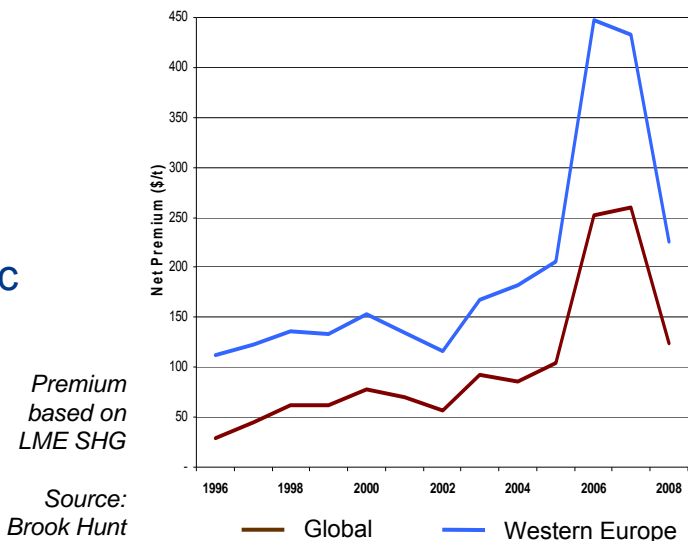
- Premiums relate to the type of metal or alloy produced as well as the regional supply-demand balance
- Nyrstar produces zinc commodity grade products such as Special High Grade (SHG) and galvanising alloys e.g. Continuous Galvanising Grade (CGG)
- Nyrstar also produces significant volumes of zinc specialty alloys (such as ZAMAK die-casting alloys in Europe and EZDA in Asia) which have historically had higher premiums
- Nyrstar negotiates premiums annually and has an off-take agreement for commodity grade products
- Spot premiums can be found in Brook Hunt and Zinc Monitor and are indicative of the trend in premiums



## Zinc products



## Zinc Location Premium



## 4. By-products - Acid

- Sulphuric acid is the main by-product for zinc smelters
- It is produced during the roasting stage for zinc smelters, and during the sinter stage for lead smelters
- Sulphuric acid is predominantly used by the chemicals, mining and fertiliser industries
- Indicative movements in acid prices by region can be found in industry reports (such as the PentaSul report) and sulphur price indexes
- Production volumes can be estimated based on historic data:
  - For zinc smelters, for every 1 unit of Zinc Market Metal produced, 1.25 units of acid is produced
  - For lead smelters, for every 1 unit of Lead Market Metal produced, 0.3 units of acid is produced
- There are several factors which impact acid earnings:
  - Regional variation in acid usage and markets
  - Mix of domestic sales and exports
  - Regional differences in contract terms: in some regions and with some customers annual contract terms are negotiated, for others shorter terms are used

# 4. By-products - Other

## **Zinc Smelters**

- Leach product: the value of leach product, which is the saleable product of the leaching process, varies depending on market conditions and concentrate mix
- Other: This includes products such as Cadmium, Indium and Copper Sulphate. Production and earnings vary year on year due to a number of factors

## **Lead Smelters**

- By-products at Port Pirie are anything other than zinc and lead (Port Pirie re-classified zinc earnings from By-Products to Free Metal in 2009)
- The Port Pirie lead smelter has the flexibility to efficiently process a wide range of raw materials to produce refined lead, zinc, copper, silver and gold. Therefore by-product contribution is typically higher than for zinc smelters
- Various factors determine the earnings contribution of the major by-products; Silver, Copper and Gold, including
  - Market prices, recovery rates
  - Payable components for Ag, Cu and Au which depends on concentrate grade
  - Silver Refining Charge (RC) for lead concentrates with high levels of payable silver
  - Silver Premiums

## 5. Other

The key components of Other Gross Profit include:

- ▮ Costs of alloying materials
  - Cost of alloying metals for input into the process of producing finished metal products
- ▮ Realisation expenses
  - Includes freight costs incurred in delivering goods to our customers
- ▮ Hedging Gains and Losses
  - Fair Value and Cash Flow Hedge Instrument gains / losses relating to metal price and exchange rate hedging activity which includes metal at risk and fixed forward sales
- ▮ Consolidated contribution from non-primary metal producing sites
  - Total gross margin contribution received from other operations that are financially consolidated

# Gross Profit – High Level Model

## H1 2009 Results

Nyrstar uses a model similar to this to validate the output of more detailed models

INPUTS		
Zinc MM Production (ex Pirie)	A	363,000
Zinc MM Production (Pirie)	B	18,000
Lead Production (Port Pirie)	C	110,000
Zinc Recovery (ex Pirie)	D	96%
Zinc Recovery (Pirie)	E	90%
Lead Recovery	F	99%
Paid Zinc (ex Pirie)	G	85%
Paid Zinc (Pirie)	H	10%
Paid Lead	I	95%
Zinc Concentrate Grade	J	54%
Lead Concentrate Grade	K	60%
LME Zinc Price (USD/t)	L	1,322
LME Lead Price (USD/t)	M	1,330
EUR :USD	N	1.34
Realised TC (Zn) USD/t	P	213
Realised TC (Pb) USD/t	Q	185
Zinc (Average Premium)	R	135
Lead (Average Premium)	S	70

\* See TC example for calculation - H1 09 Realised TC: \$204 / dmt on basis price of \$1,250



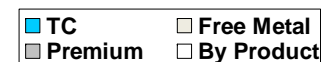
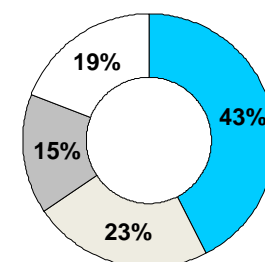
CALCULATION			
		€m	%
Zinc TC (€ m)	T*	111	45
Lead TC (€ m)	U*	26	
Free Zinc - ex Pirie (€ m)	V*	41	20
Free Zinc - Pirie (€ m)	W*	16	
Free Lead (€ m)	X*	4	
Zinc Premium (€ m)	Y*	38	14
Lead Premium (€ m)	Z*	6	
By-products (€ m)	AA*	64	21
Other (€m)	AB*	(23)	
<b>TOTAL Gross Profit</b>		<b>283</b>	

T\*  
U\*  
V\*  
W\*  
X\*  
Y\*  
Z\*  
AA  
AB

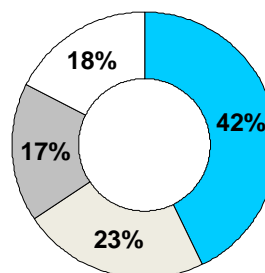
$(A / D / J) * P / N$   
 $(C / F / K) * Q / N$   
 $A * ((D - G) / D) * L / N$   
 $B * ((E - H) / E) * L / N$   
 $C * ((F - I) / F) * M / N$   
 $(A + B) * R / N$   
 $C * S / N$   
H1 2009 figure  
H1 2009 figure

Gross Profit by Element

2007 Gross Profit



2008 Gross Profit

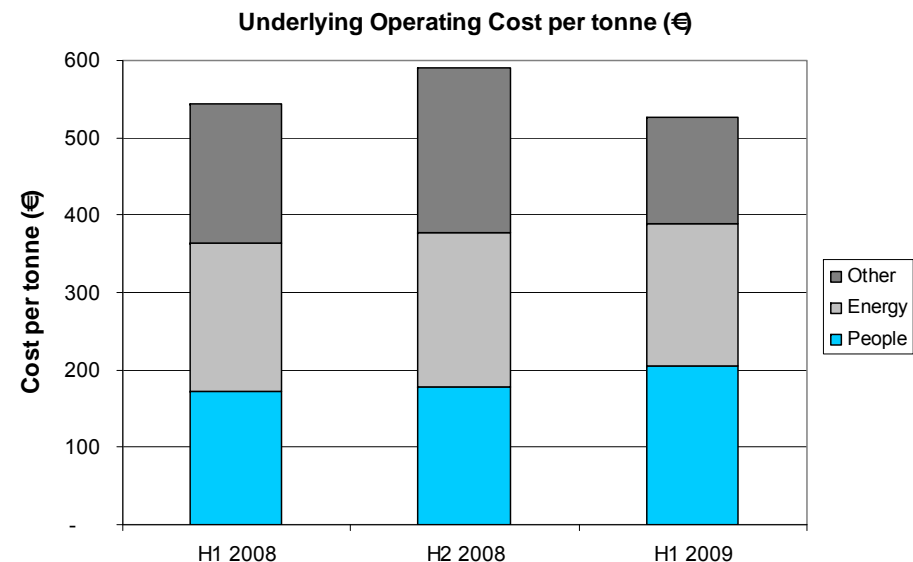


# Operating Costs

- Operating Costs consist of:
  - People (employee costs)
  - Energy (primarily electricity for zinc smelters, and coke/coal for lead smelters)
  - Other (including Stores and External Services)
- In 2009 Nyrstar reported an underlying operating cost per tonne figure to the market based on:

$$\text{Group Underlying Cost per tonne} = \frac{\text{Total Group Underlying Operating Costs}}{\text{Total Zinc Market Metal Production} + \text{Port Pirie Lead Market Metal Production}}$$

- In H1 2009 this figure was €527 / tonne compared to €576 / tonne in 2008, despite operating at reduced production levels
- Nyrstar is targeting €500 / tonne for 2009



# EBITDA - H1 2009 Results

- Therefore by forecasting production levels, calculating Gross profit, and applying an operating cost per tonne figure, EBITDA can be estimated

$$\text{EBITDA} = \text{Gross Profit} - (\text{Total Zinc \& Lead Production} \times \text{Cost per tonne})$$

- Gross profit €283m (from slide 19)
- Total Zinc + Lead MM production (ex ARA) 482,000t (H1 2009)
- Underlying Operating Cost per tonne €527/t (Using Nyrstar H1 figure)
- H1 2009 EBITDA Estimate: €283m – (482,000t x €527/t) = **€30m**

# Working Capital

- The information provided below is historic working capital data which may be helpful when considering working capital requirements
- Note movements in WC depend on period-end prices, not average prices for the period

Inventory – average holding period				
<i>Months</i>	Raw Materials	Work in Progress	Finished Goods	Total Inventory
Zn	1	1	0.25	2 - 2.5
Pb	1	1.5	0.25	2.5 – 3
Ag	1	3 – 4	0.5	4 - 6
<b>Notes</b>	Concentrate = Production / Grade / Recovery	Completion Rate and Conversion Cost assumed	Reflect conditions of Off-take Agreement	

Trade Payables		
Category	Average Period (Months)	Notes
People Cost	-	Paid in same month
All other Opex costs	1	Paid in following month
Capex	1	Paid in following month
Raw Materials (COGS)	0 - 1	90% paid in the same month of purchase 10% paid in the following month

Trade Receivables		
Category	Average Period (Months)	Notes
Debtors	0.75 - 1	Average outstanding receivables as proportion of revenues