

O Cenário Mundial da Indústria da Galvanização Geral

The World of Zinc and General Galvanizing

Frank E. Goodwin
Director, Technology & Market Dev't
International Zinc Association

- IZA Background
- Zinc Statistical Review
- General Galvanizing Market Developments
- Zinc: Solving World Problems

- Established – 1991
- 80% of WW zinc production
- 60% of world production
- Regional presence
- 3 Categories:
 - 43 Full Members
 - 110 Affiliate Members
 - 52 Associate Members



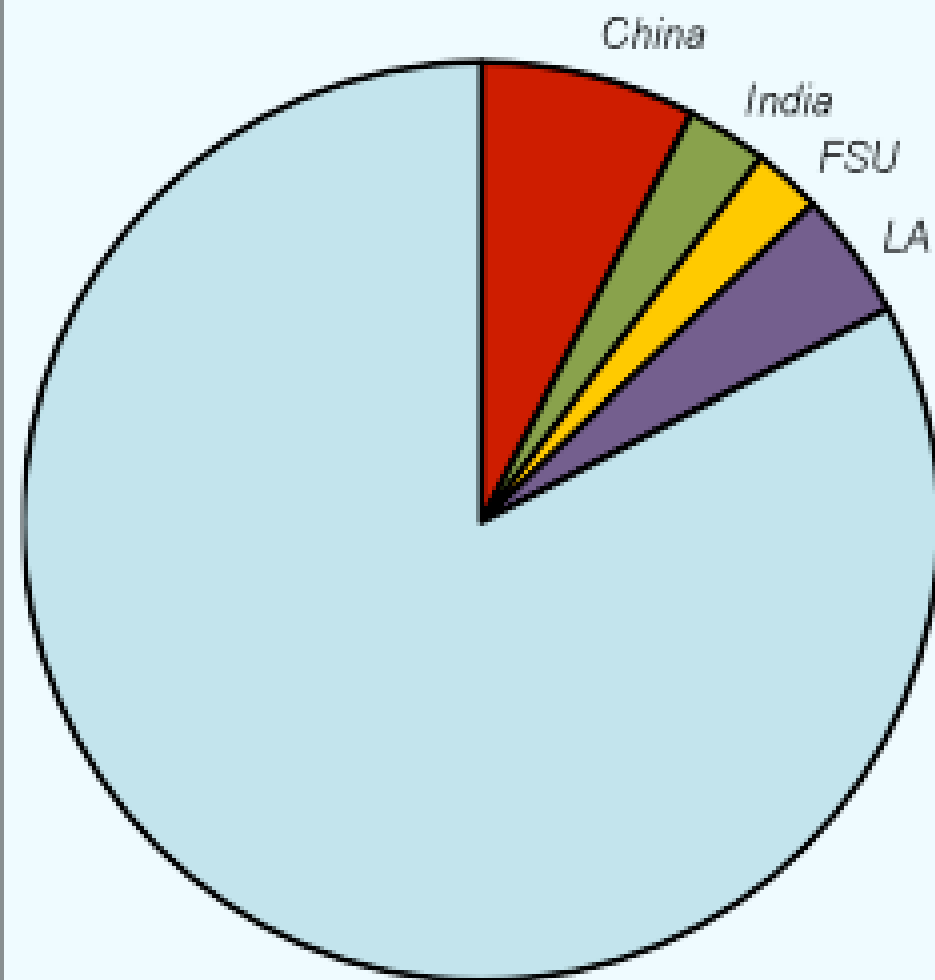
Supporting and advancing zinc products and markets through research, development, technology transfer and communication of the unique attributes that make zinc sustainable and essential for life



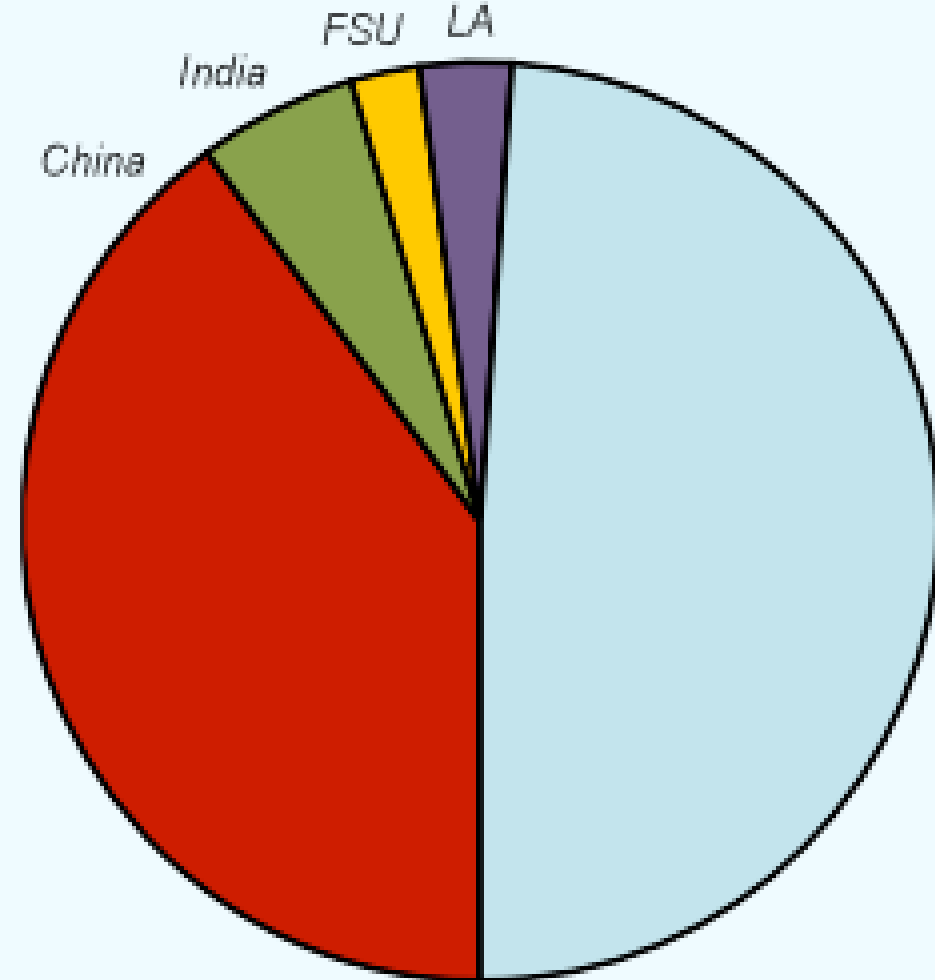
	Galv Sheet ¹ MT	Zn MT	HDG MT	Zn MT
NAFTA	16,404	492	3,785	246
USA	13,258	398		
Canada	1,816	54		
Mexico	1,330	40		
Latin America	3,448	103	695	45
Europe	29,461	884	7,500	478
CIS	3,882	116	500	33
Asia	55,609	1,668	12,000	780
China	27,139	814	7,000	455
Japan	14,260	428	1,350	88
Korea	8,728	262	1,400	91
India	5,000	264	2,896	125
Oceania, Africa, ME	4,979	149	2,050	133
Total	118,783	3,677	28,726	1,804



The BRICs already account for a major part of zinc demand



2010 real GDP at market rates

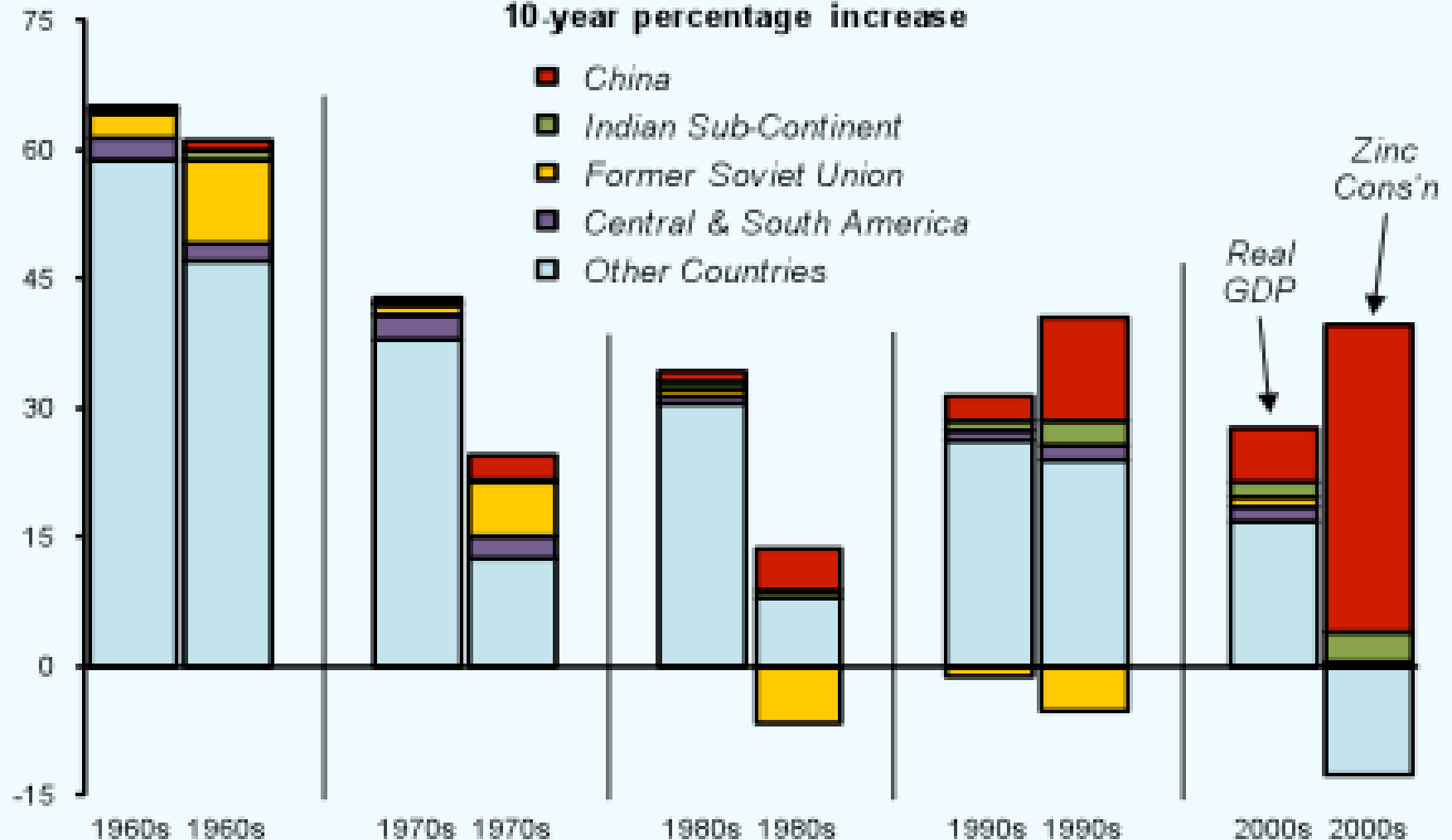


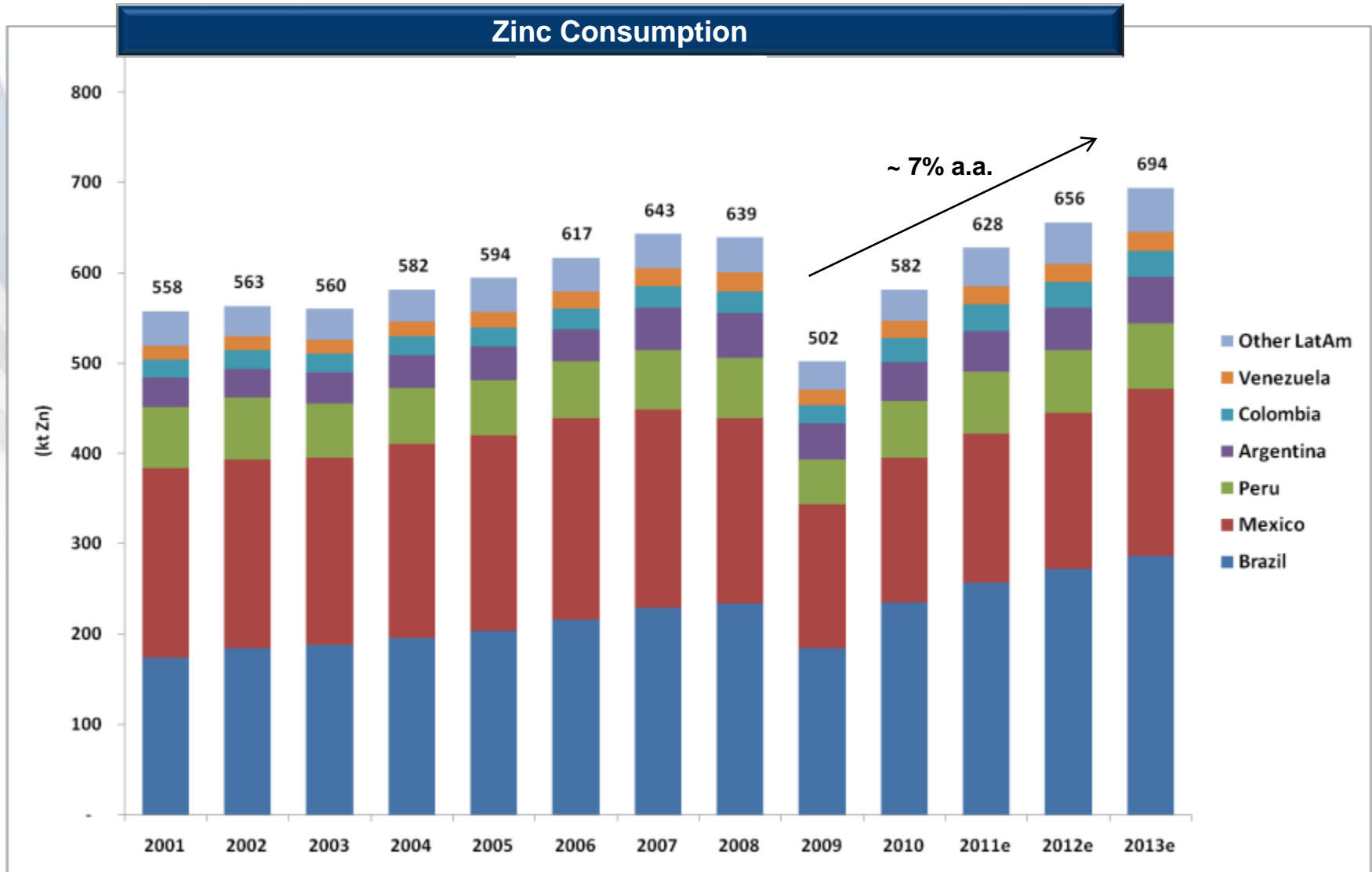
2010 zinc consumption



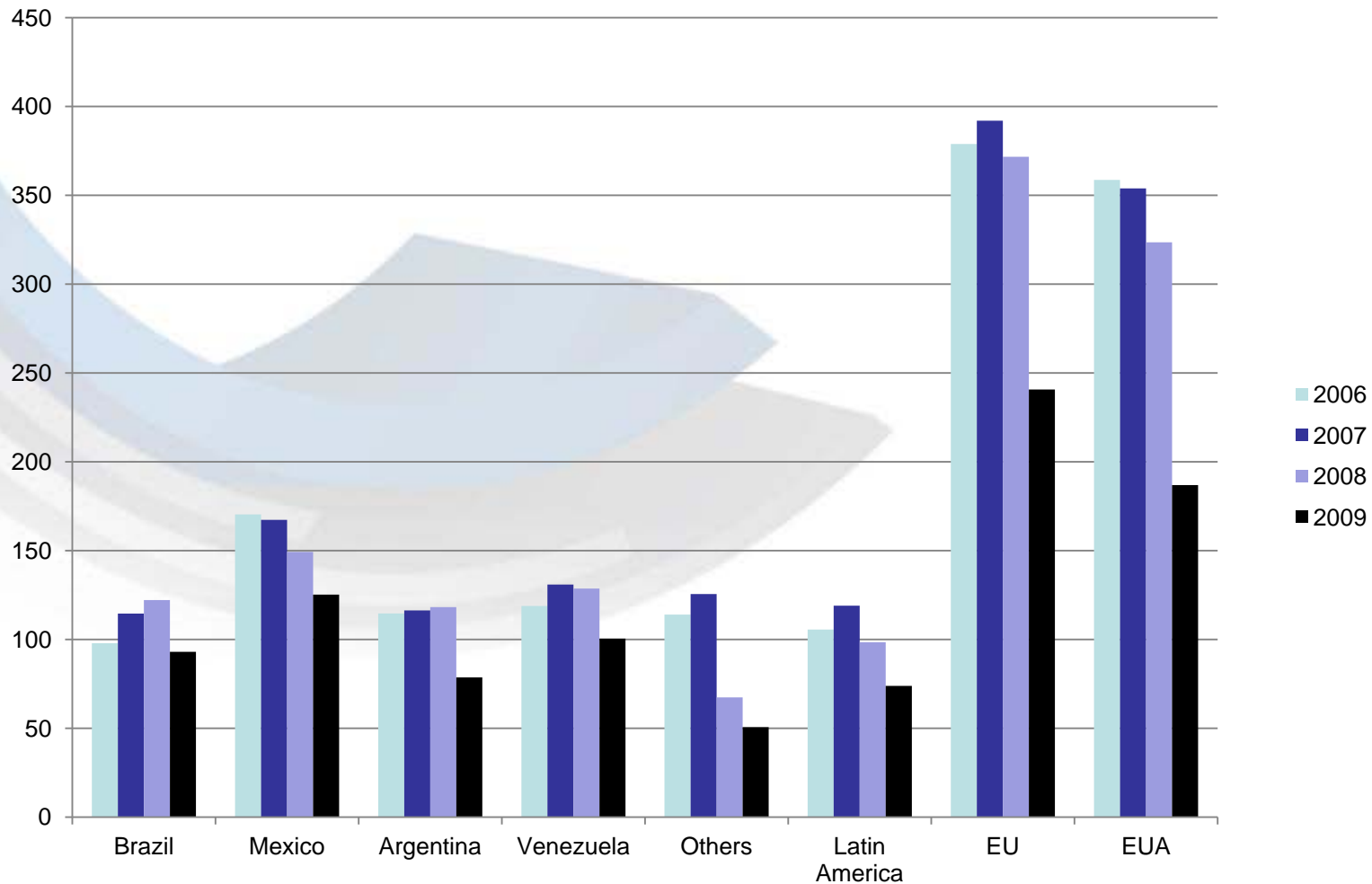
Zinc consumption growth has already switched away from the developed world

10-year percentage increase



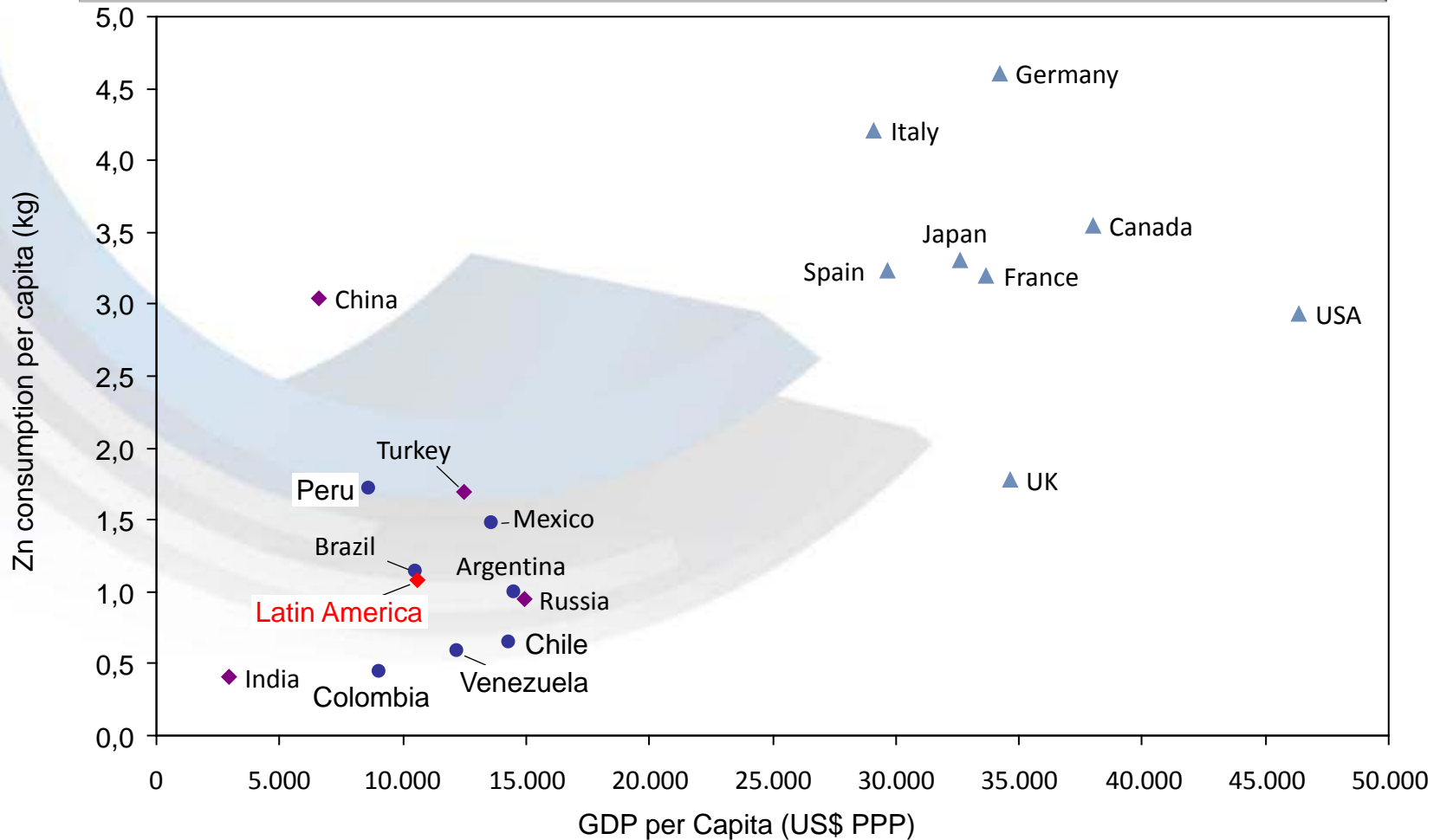


Apparent Steel Use per Capita – kg/inhabitant



... and so has Zn consumption ...

Zinc Consumption per Capita (2009)

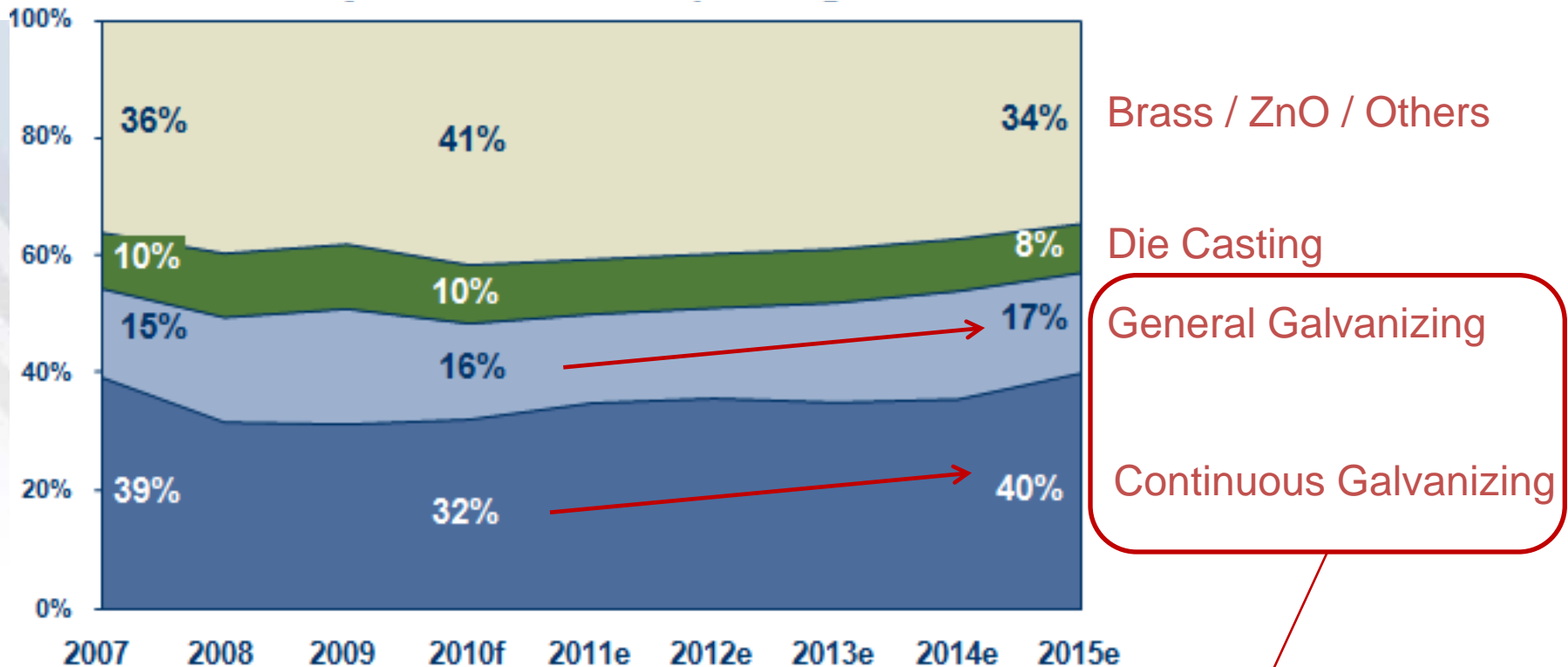




Zinc is Durable

One of zinc's most important characteristics is its ability to protect steel against corrosion. The life and durability of steel are greatly improved when coated with zinc. No other material can provide such efficient and cost-effective protection for steel.

Zinc demand per segment:



Brass / ZnO / Others

Die Casting

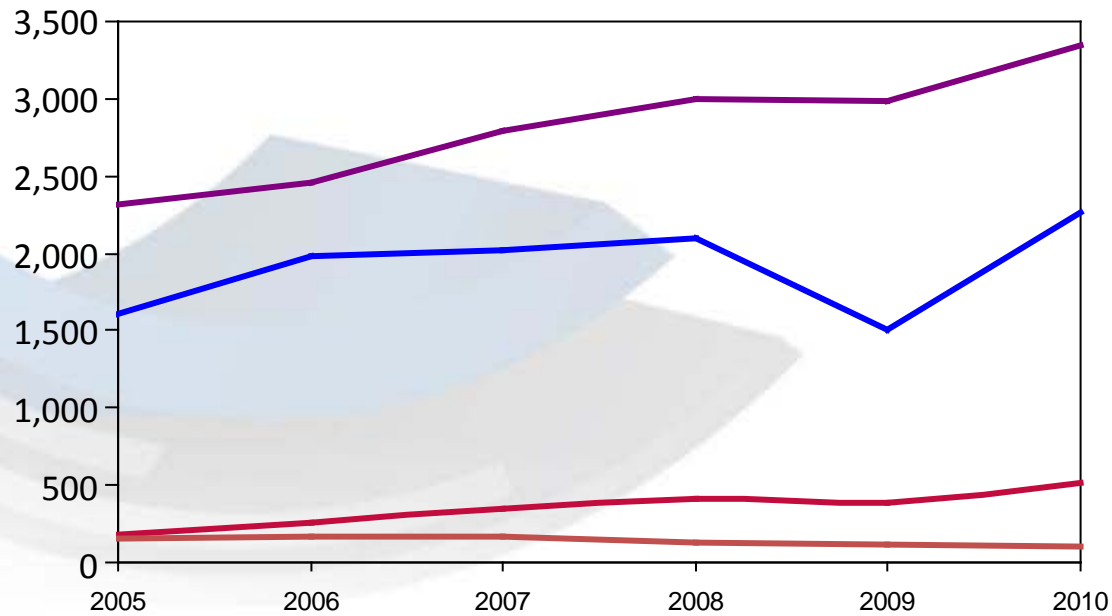
General Galvanizing

Continuous Galvanizing

Focus for market development !

Vehicles Production (units)

K Units of cars and light trucks



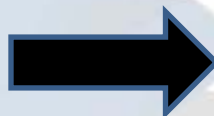
— Brasil* — México — Argentina — Venezuela

* Does not include buses and heavy trucks

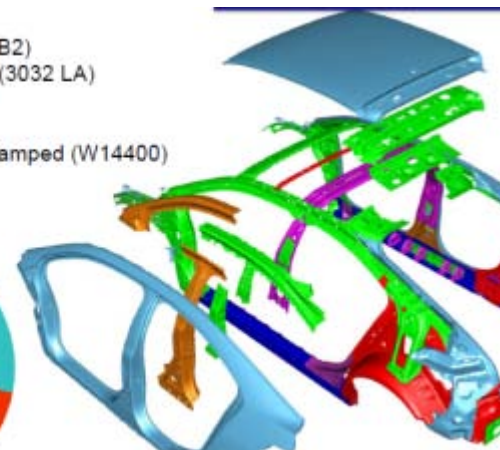
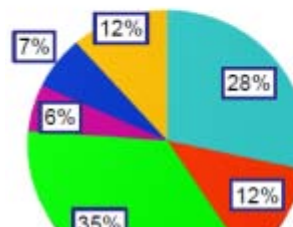
Galvanized Autobody Partnership



Chevy Volt



- Mild / Low Carbon
- Bake Hardenable (3032 B2)
- High Strength Low Alloy (3032 LA)
- Dual Phase (3399 DP)
- Martensite (3399 MS)
- Press Hardened / Hot Stamped (W14400)



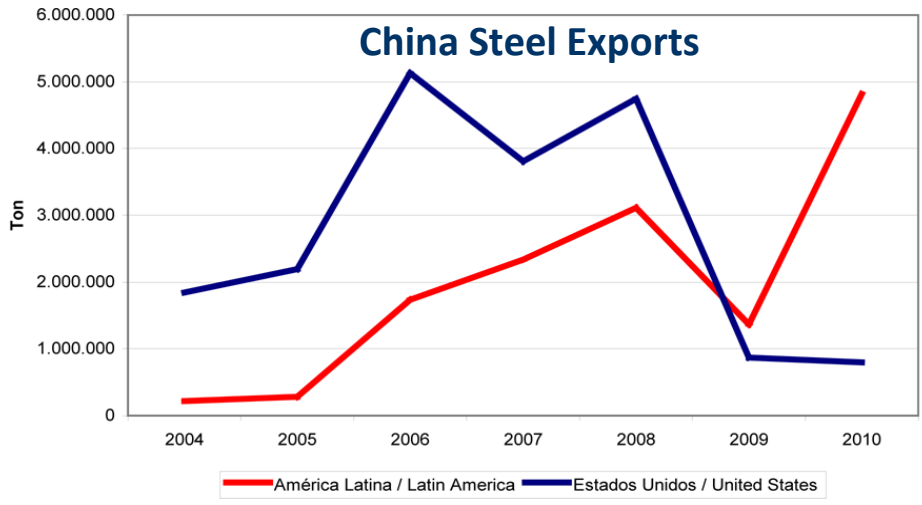
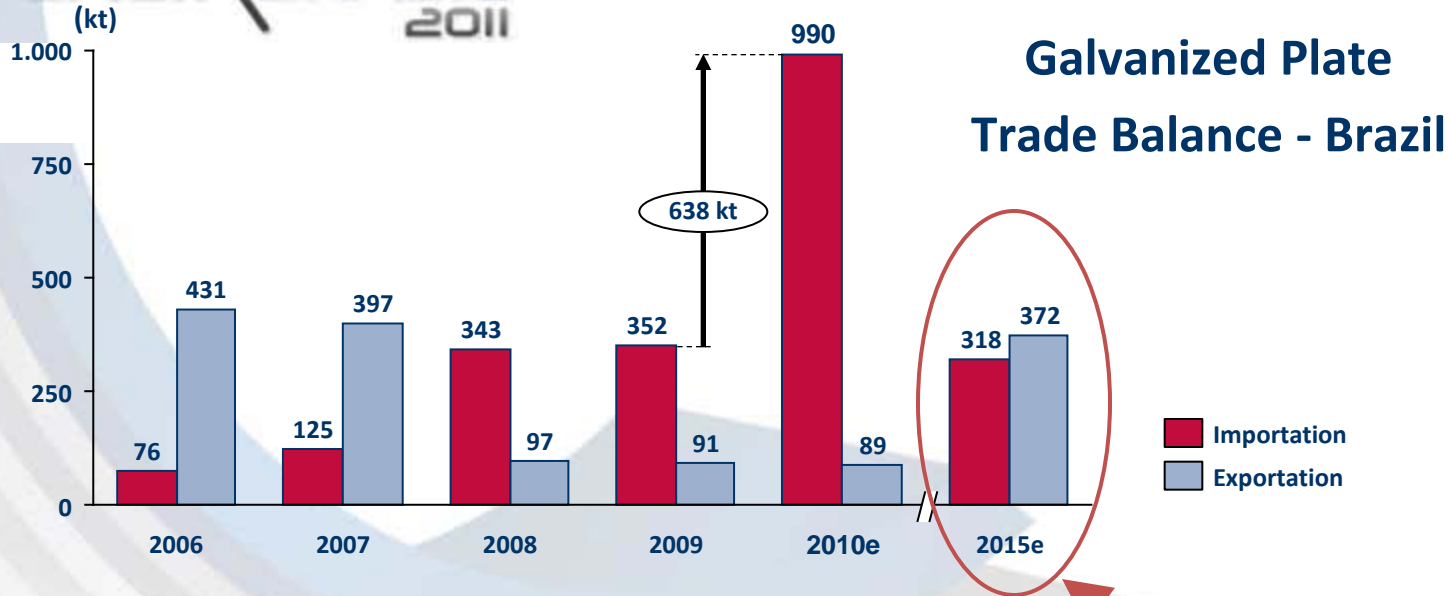
Ford Explorer

23 automakers, steelmakers and suppliers working with the Zn industry



Chrysler Jeep

Galvanized Sheet will be back to balance ?



Demand Drivers

Planned Investments - CGG

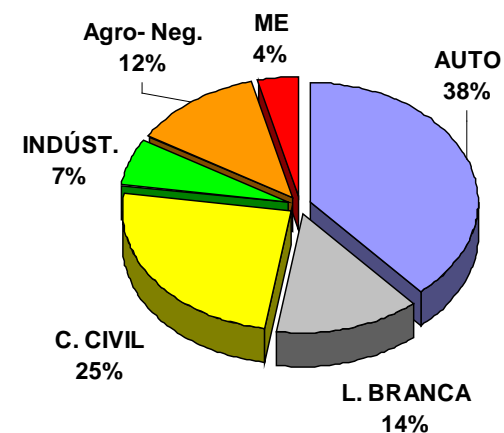
Player	Additional capacity Galv steel (kt/yr)	Additional zinc consumption (kt/yr)	Zinc consumption at start up (kt)	Start up year
Arcelor Mittal Vega - Linha 2	350	8	0,3	2010
Arcelor Mittal Vega - Linha 3	500	10	0,3	2015
Usiminas Unigal - Linha 2	550	12	0,5	2011
Usiminas Nova Linha	300	6	0,3	2015
CSN Galvasud	350	7	0,4	2015
Vale Alpa	150	3	0,3	2014
Gerdau Cotia	30	0,9	0,2	2012
ArcelorMittal Longos-Nordeste	60	1,5	0,1	2014
Morlan	10	0,2	0,1	2014
TOTAL CGG	2300	49	2,5	

Flat Products

Long

Segment	Civil Constr.	Cars	White Goods	Agro Bus.
Flat products	X	X	X	
Long products	X			X

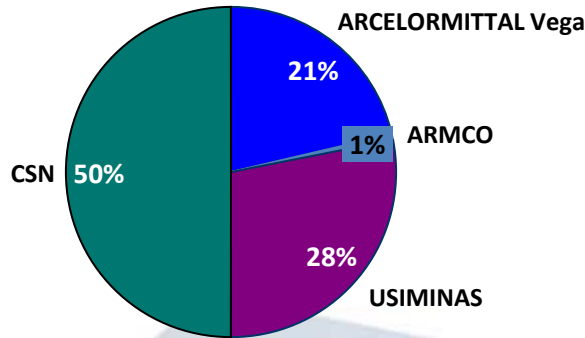
Zinc demand within CGG



Galvanized steel production capacity

Flat products

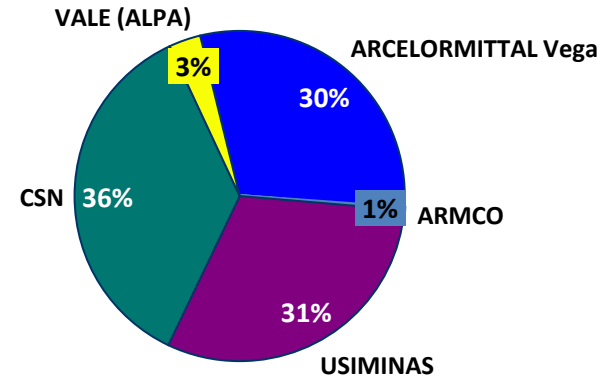
2010



2.720 kt/yr

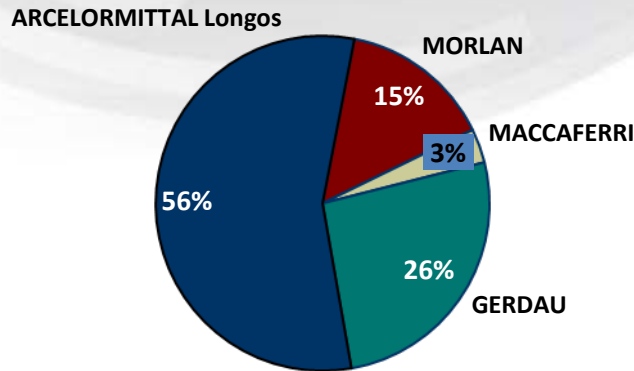
+75%

2015



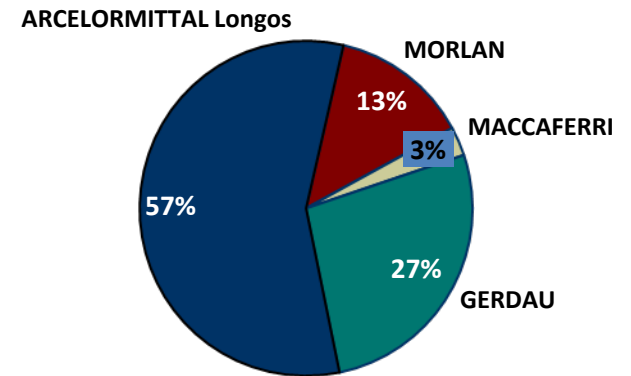
4.770 kt/yr

Long products



550 kt/yr

+18%



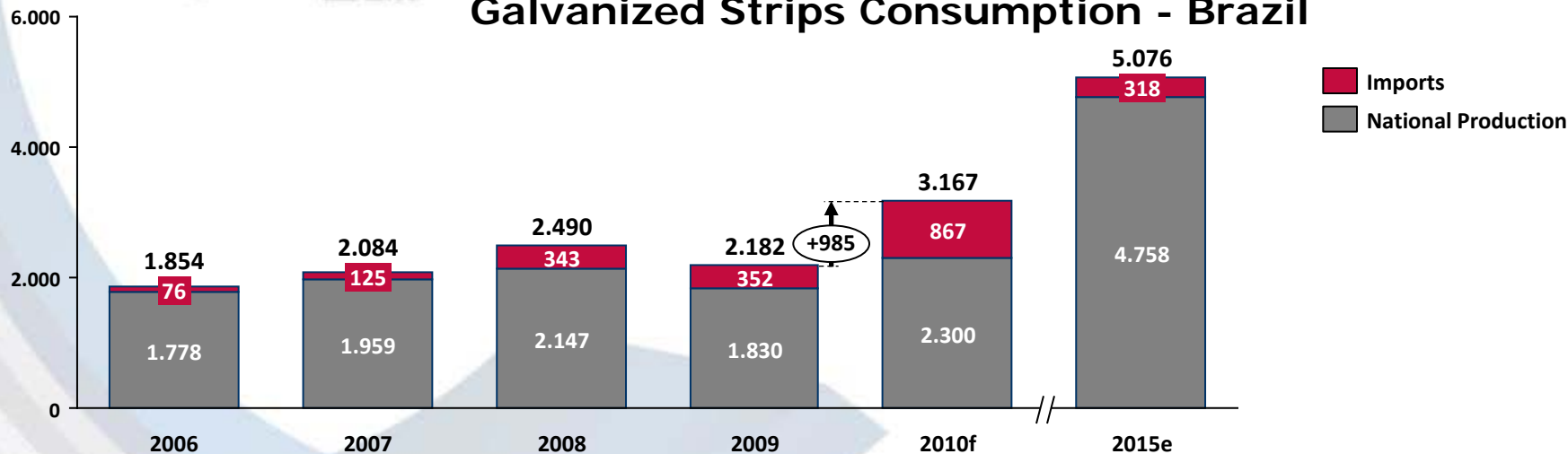
650 kt/yr

Galvanized Steel Strips

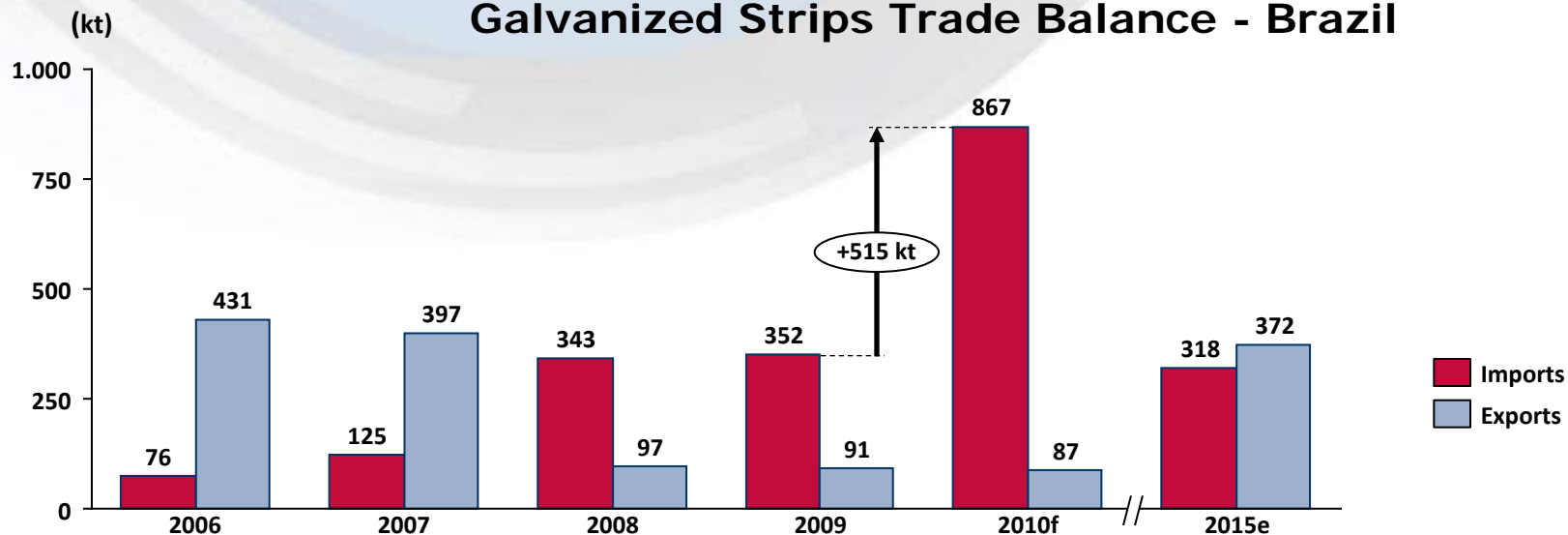
REALIZAÇÃO



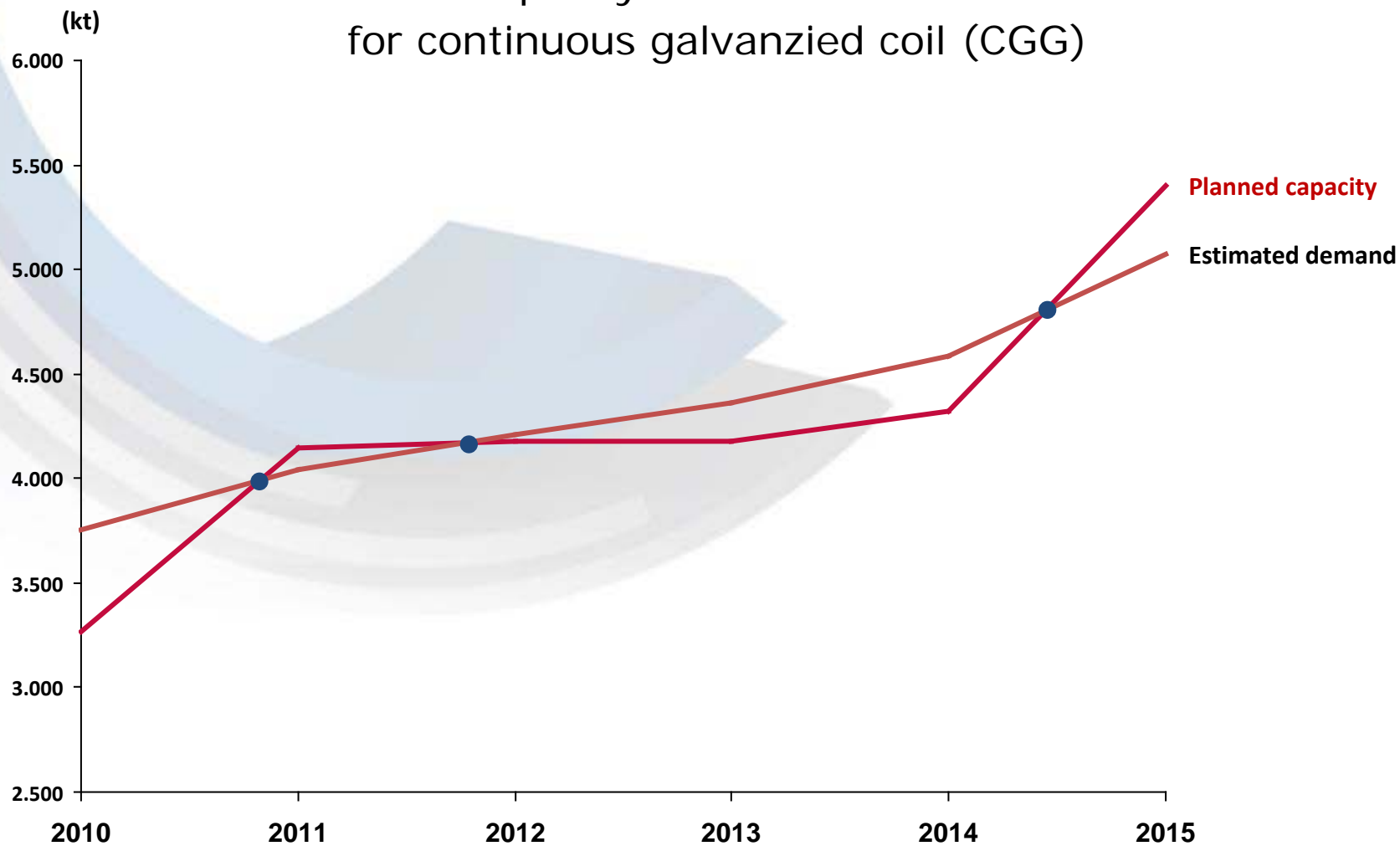
Galvanized Strips Consumption - Brazil



Galvanized Strips Trade Balance - Brazil



Installed capacity *versus* Brazilian demand for continuous galvanized coil (CGG)



Galvanizadores*
Quantidade por mesorregião



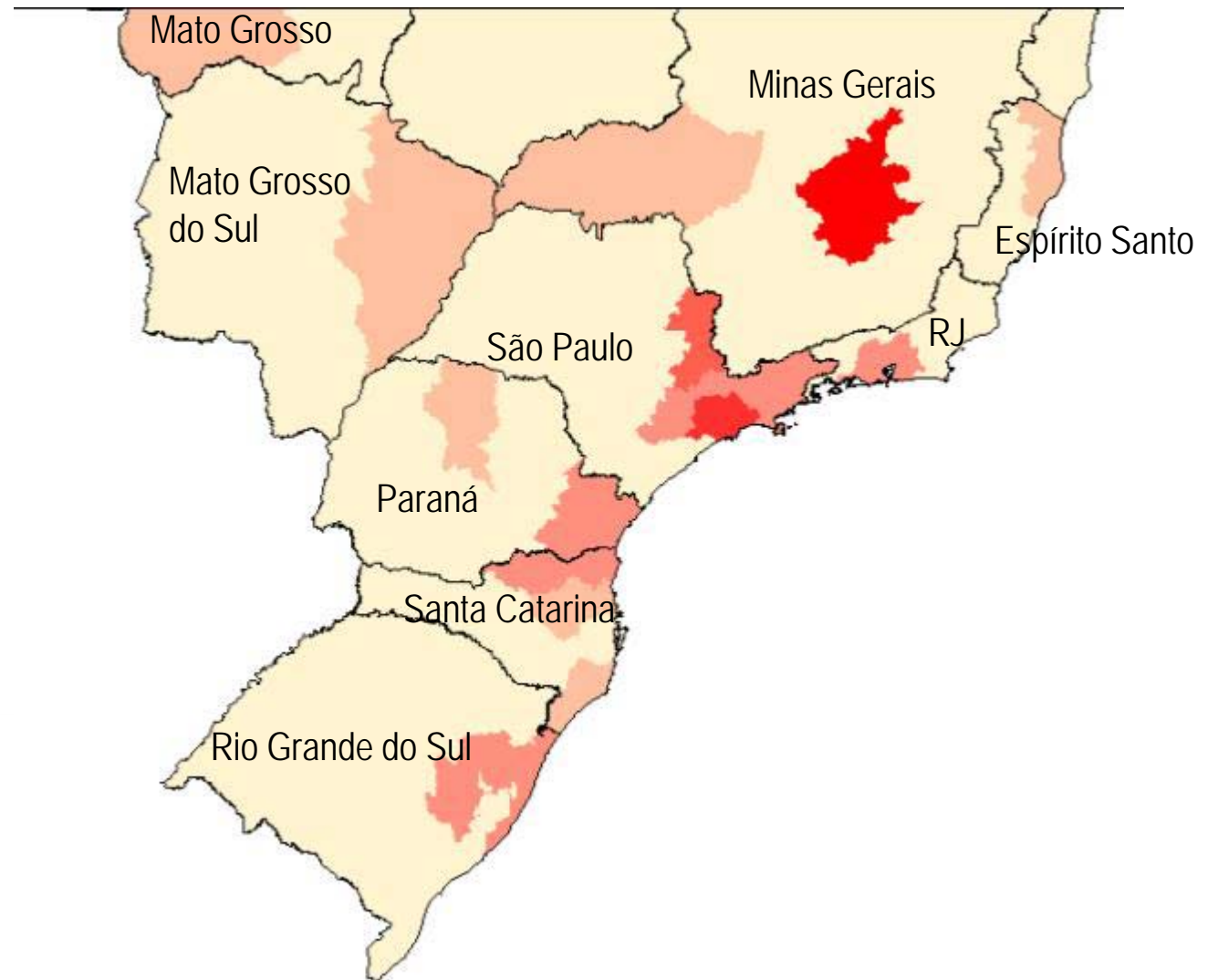
* Players that galvanize over 3 kt of steel per year



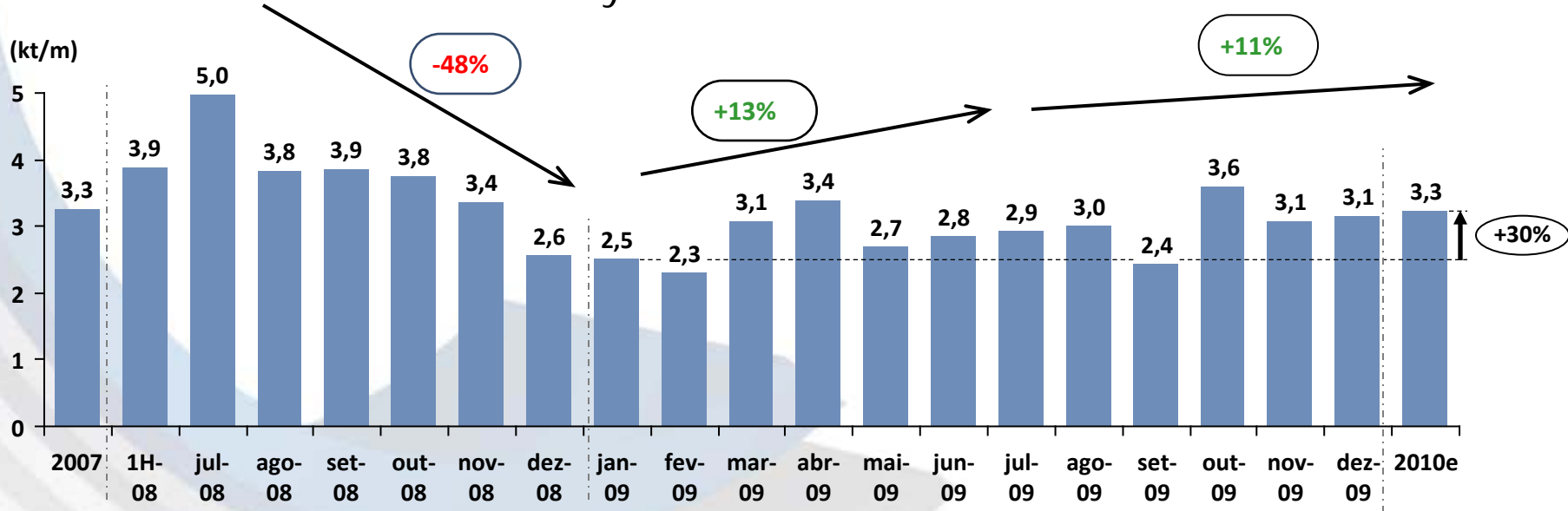
Galvanizadores*
Quantidade por mesorregião



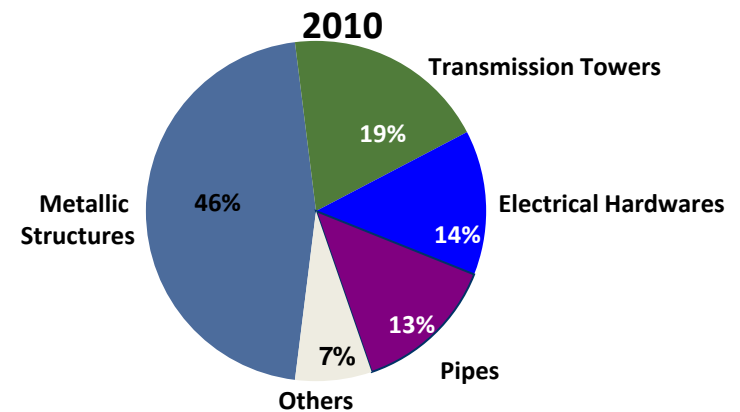
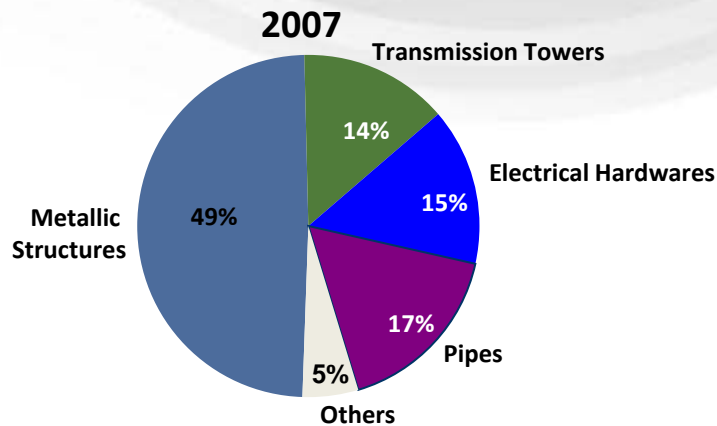
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Demand – Metallic Zn Monthly Brazilian Market

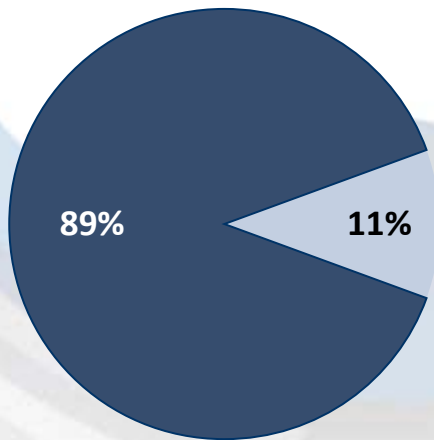


Brazilian Market Segmentation

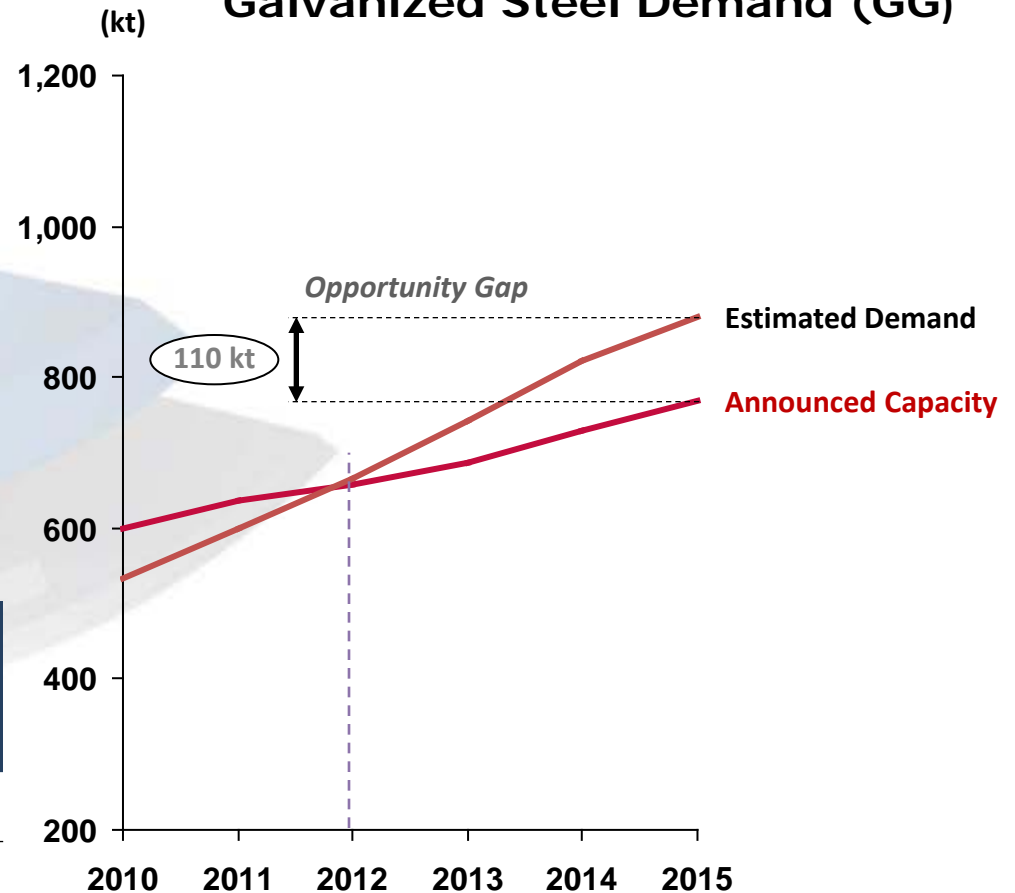


HDG Steel Production Capacity

2010 ~ 600 kt/y



Installed Capacity versus Galvanized Steel Demand (GG)



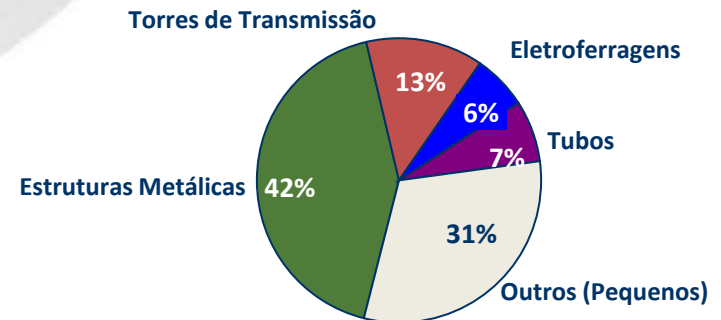
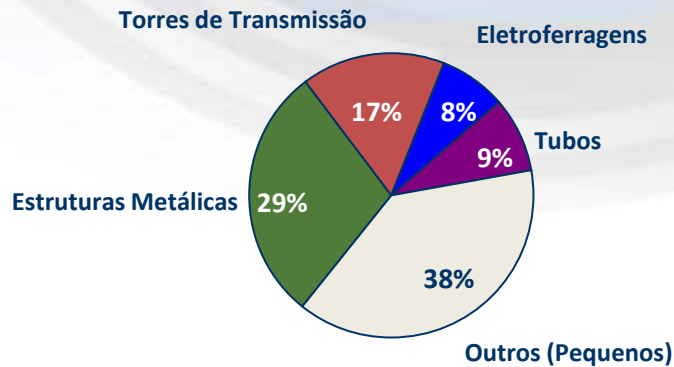
Announced Expansions (kt/y of galvanized steel)

Present Capacity	600
Announced Investments	+88
Estimated Capacity in 2013	+15% 688

Forecasted Expansions (kt/y of galvanized steel)

Present Capacity	600
<i>Forecasted Investments</i>	<i>+ 145</i>
Estimated Capacity 2015	+24% 745

Brazilian Market Segmentation



“Grow and protect the world markets for zinc”

- Global Programs
 - -Zn Nutrition
 - -Zn Corrosion Protection
 - -Diecastings
 - -Oxides
 - -Brass

- Regional Programs

- -China, India, Latin America, Europe, North America, Europe, Southeast Asia, Africa, Russia



- **Developed World: Sustainability, Life Cycle Cost, Life Cycle Assessment, LEED, Increased Use of High Strength Steels, Rebar**
- **Developing World: Raise awareness of designers and specifiers, develop codes and standards, raise quality and capacity of local HDG industry, Rebar**
- **Common Tools: Interactive Training Tool, LCI/LCA tools, Technical Information on Corrosion, Design, Painting of HDG**

- **Interactive Training Tool**
- **Steel Foresight Program**
- **Galvanized Rebar**
- **Colored Zn**

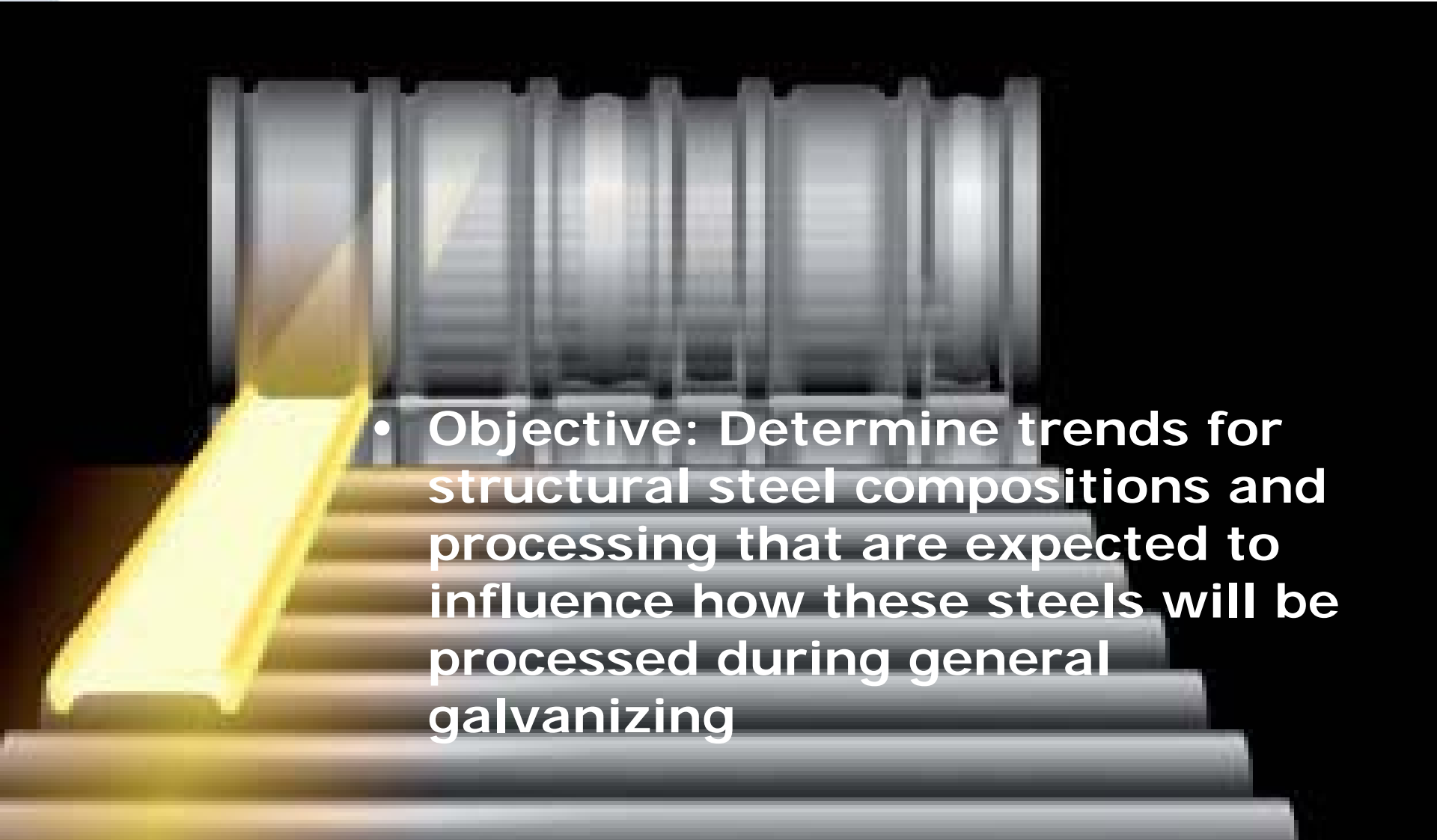
- Developed during \$1.5M China HDG program with Common Fund for Commodities
- Available in Chinese, English, Spanish and French
- Training Tool available to regional galvanizing associations



- Operators' course available at www.galvtrainingcourse.com
- Managers' guidance document available at www.zinc-resource.org

- Pre-work
The complete galvanizing process including:
 - Goods receiving & materials handling
 - Jigging
 - Degreasing
 - Acid Pickling
 - Fluxing
 - Galvanizing
 - Passivation



- 
- **Objective: Determine trends for structural steel compositions and processing that are expected to influence how these steels will be processed during general galvanizing**

ZC-31 Background

Preparation of Guidance Document on the Effect of General Galvanizing on Mechanical Properties of Structural Steels

- Tested a variety of steel grades before and after cold working, then subsequently galvanized

Grades Sourced by UKGA:

- BS EN10025-2:2004 Grades S275 and S355
- BS EN10028-3:2003, Grade P460

Grades sourced by AGA:

- A36
- A572 Grades 50 and 65



		As-Received		Welded		Cold Rolled 10%		Cold Rolled 40%	
		Not Galvanized	Galvanized	Not Galvanized	Galvanized	Not Galvanized	Galvanized	Not Galvanized	Galvanized
EN 10025-2 S275	Tensile Strength (MPa)	453	461	497	480	563	560	741	706
	0.5% Proof Strength (MPa)	294	281	305	299	550	502	732	659
	Elongation (%)	45	46	28	38	18	22	8	15
EN 10025-2 S355	Tensile Strength (MPa)	531	522	558	552	644	635	811	784
	0.5% Proof Strength (MPa)	367	362	396	410	634	587	807	746
	Elongation (%)	41	43	25	33	16	20	8	15
EN 10028-3 P460	Tensile Strength (MPa)	595	597	645	593	714	734	905	860
	0.5% Proof Strength (MPa)	451	446	464	425	692	683	896	842
	Elongation (%)	36	34	29	30	21	21	10	13

ZC-31 Questions

- Are the process routes used for making new grades of “lean” high strength structural steels compatible with general galvanizing practice? If not, what needs to be done?
- One expected issue:
- “Martensite start” (transformation) temperature is typically near the galvanizing temperature in these steels – required cooling rates can be changed by manipulating steel compositions – how will this influence specifications?

Galvanized Rebar for Concrete

- Global resource at www.galvanizedrebar.com
- Case studies from USA, Singapore, Australia, Bermuda
- “100-year bridge” program now concluding, shows good results



World's largest sundial
Singleton NSW Australia
30 m³ concrete, 2.5 T HDG rebar



Longbird Bridge, Bermuda
58 years of protection by HDG rebar



Continuous rebar coating
at Xiamen Newsteel,
China with Zn-0.2%Al



Jet wiping of Zn-12%Al
profile at Onesteel,
Newcastle, Australia using
new dry flux technology

- Research proposal being developed to secure EUR 1.5M from EU
- In-kind participation with European galvanizers



Colored bicycles at Kokkola Zn,
Finland



- China
- India
- Russia
- Asia/Pacific
- South Africa
- (Latin America, NAFTA and Europe to be covered by other speakers)
- Convince galvanizing to designers, specifiers, decision-makers on advantages of HDG for corrosion protection via seminars, publications, internet tools, alliances with professional and industry associations
- Educate students: the decision-makers of the future
- Assist in national standards development





Galvanized Rebar

- Market potential > 200 000 tonnes zinc per year
- New product under development with Industrial partner
- Centres of excellence identified

Construction

- Close partnership with CSCS
- Speaking at key conferences
- Joint Seminar – November 2011
Market size > 0.5m tonnes zinc per year
- Over 75% of large bridge projects in China
- **Standards development**

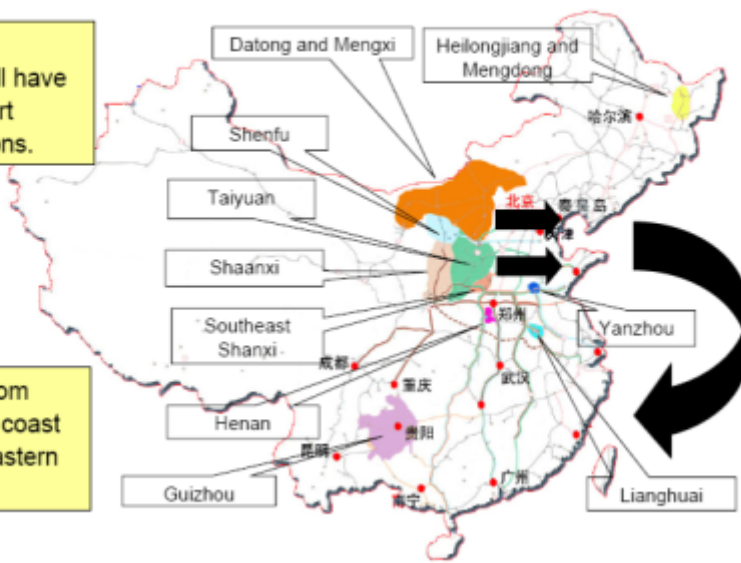
High Speed Lines

Freight Lines

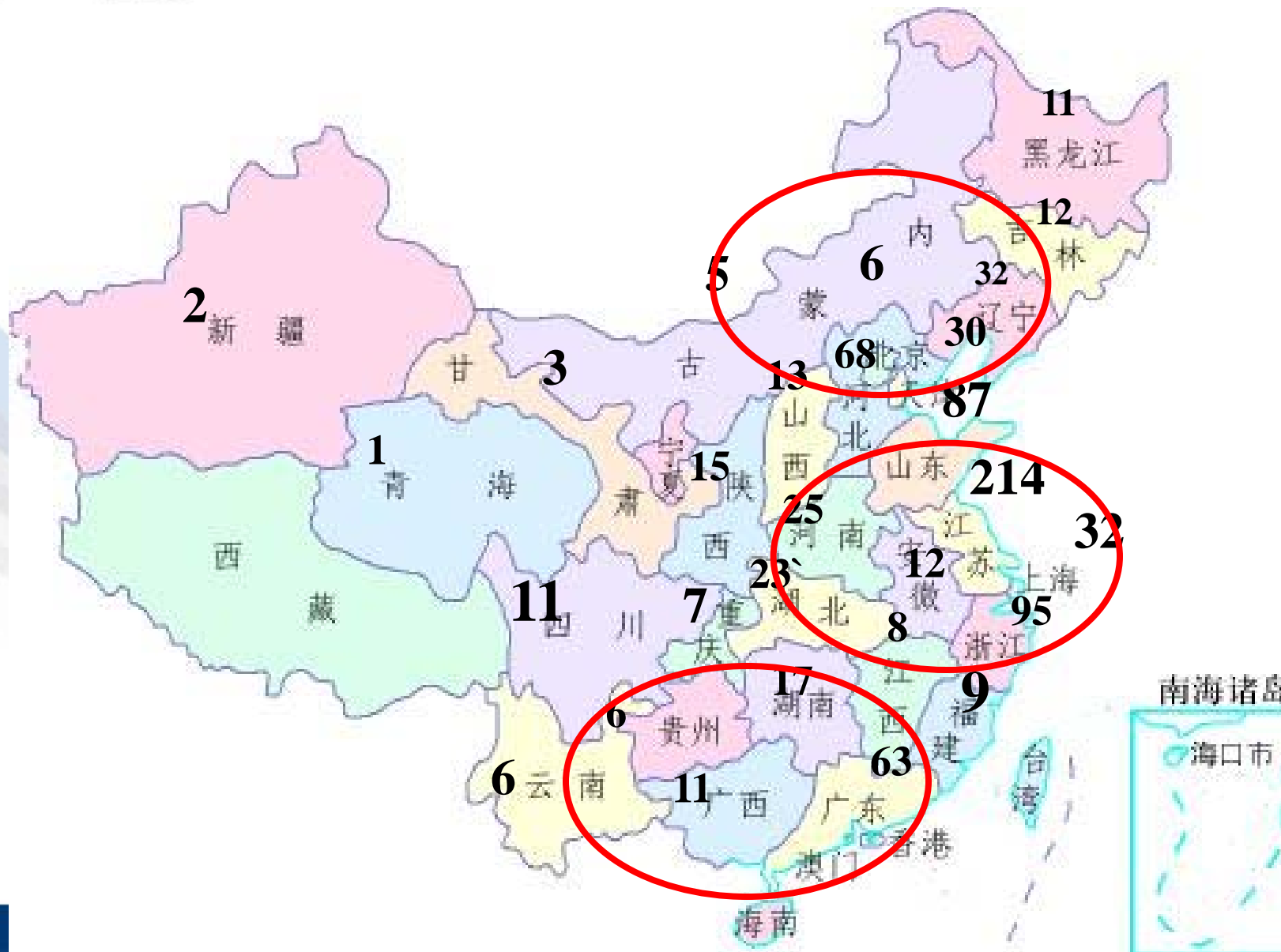
MLTDP improvements to the coal network

In 2020, top ten coal transport corridors will have an outbound transport capacity of 2 billion tons.

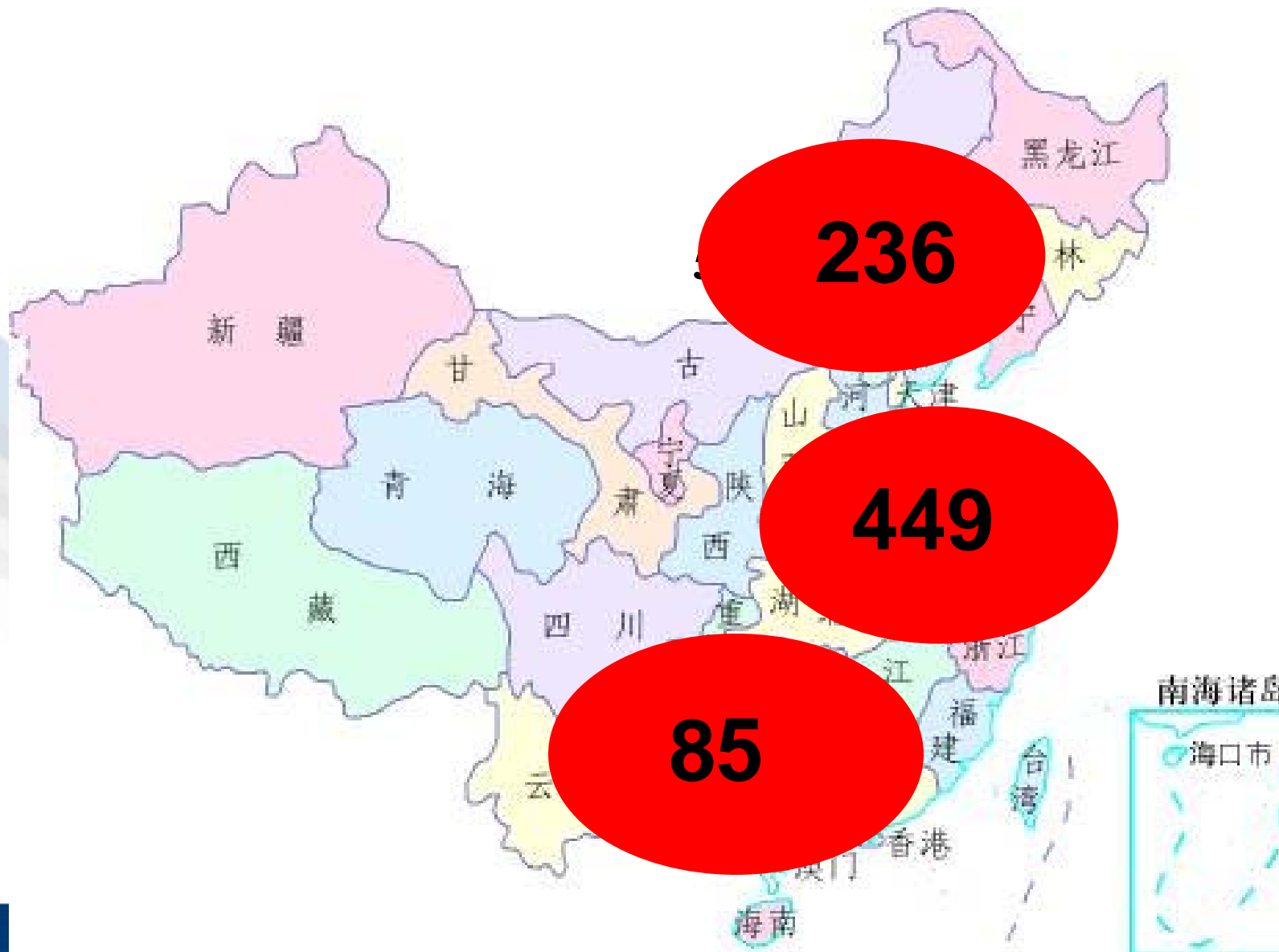
Main coal flows are from northern mines to the coast and then by ship to eastern and southern China.

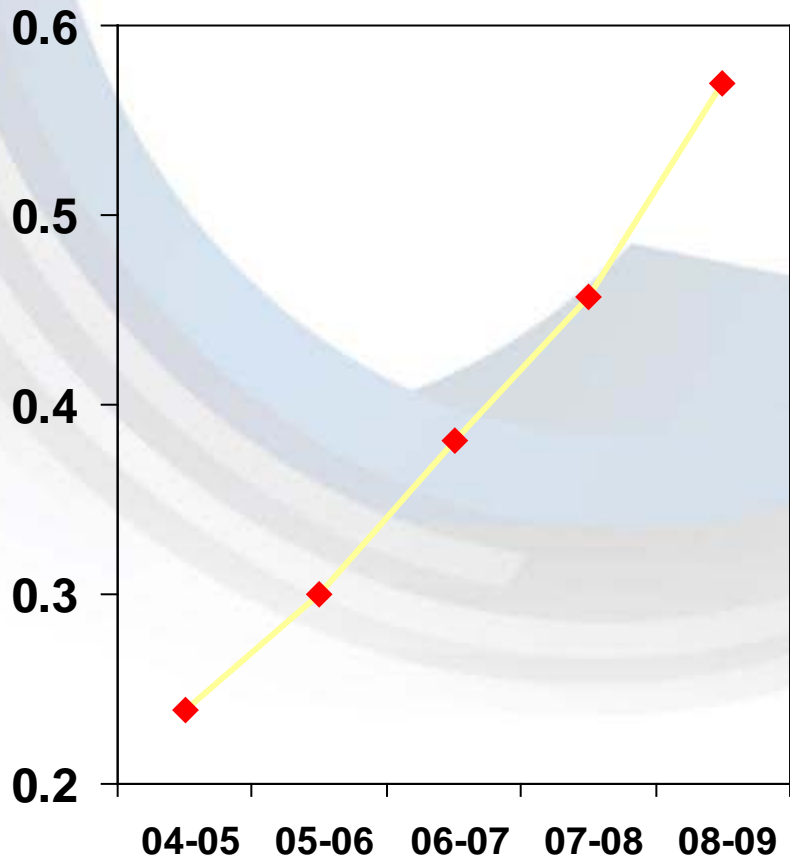


- Stimulus package of over \$1 trillion in place
- 30% went to railway development
- All catenary systems will now be HDG
- Likely 16 million tons HDG, 1 million tons Zn
- Greatest market potential in freight lines



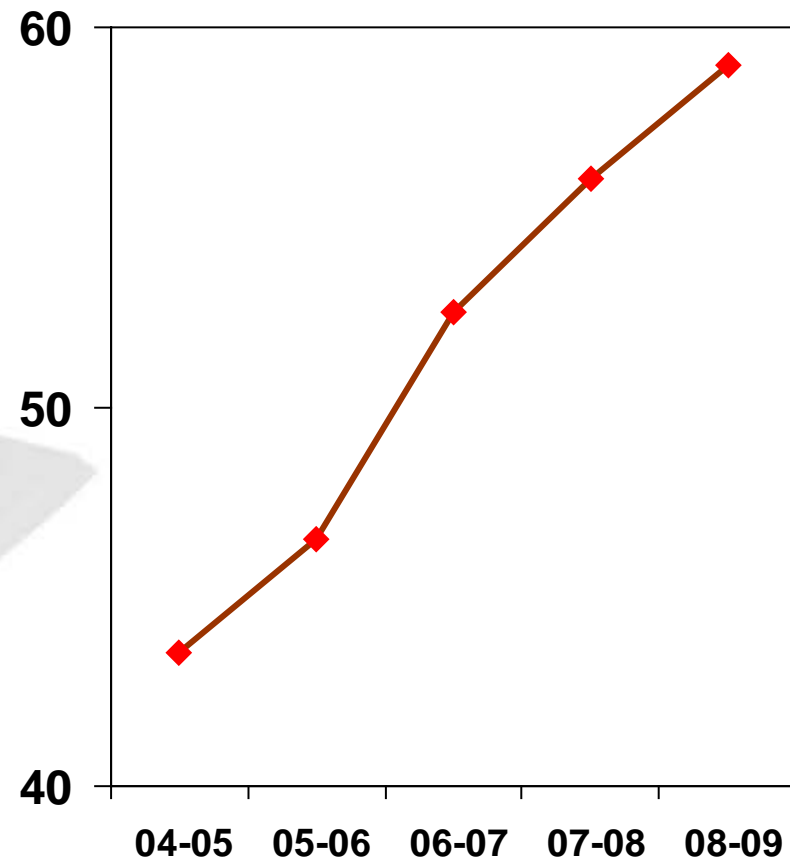
HDG jobbing- China





Zinc

(million tons)

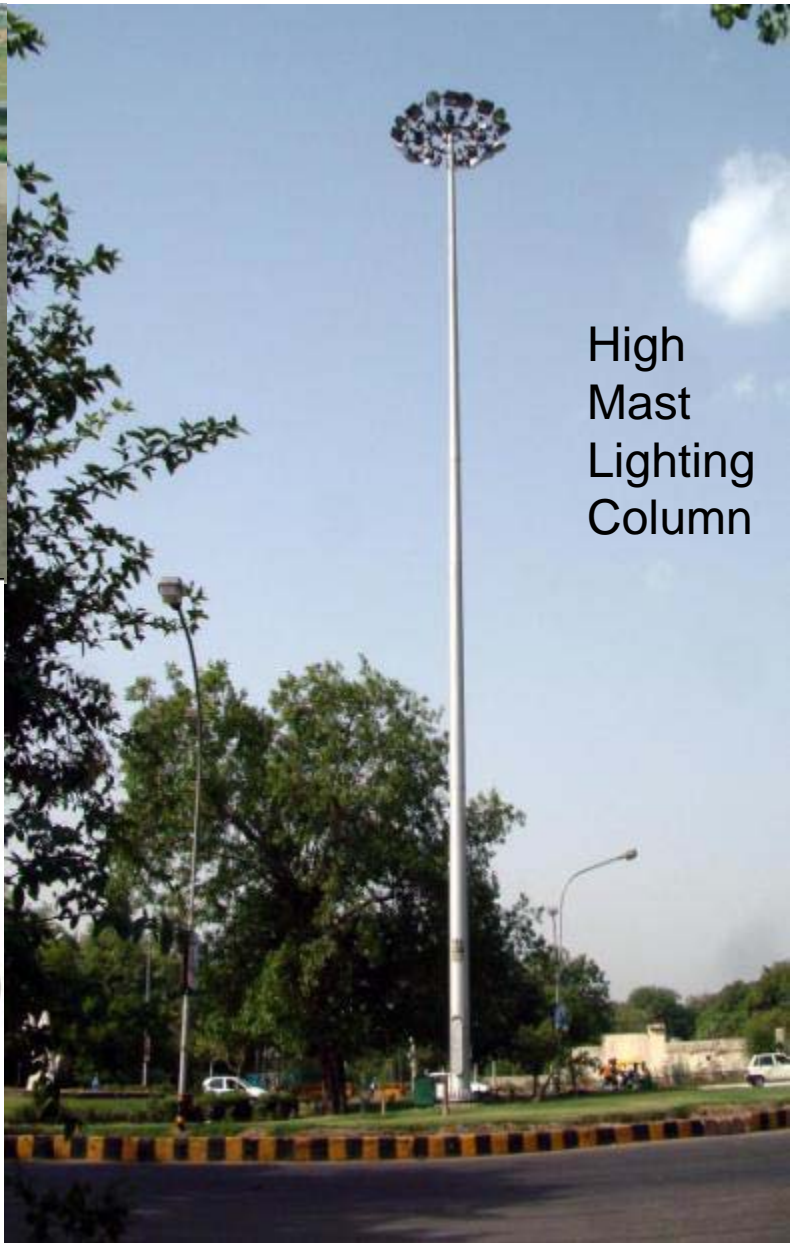


Steel



Sector	Rs (Crores)	USD \$Billion
Power	666,525	136.3
Telecom	258,439	53
Highways	314,152	64.4
Ports	87,995	18
Aviation	30,968	6.3
	1,358,079	278

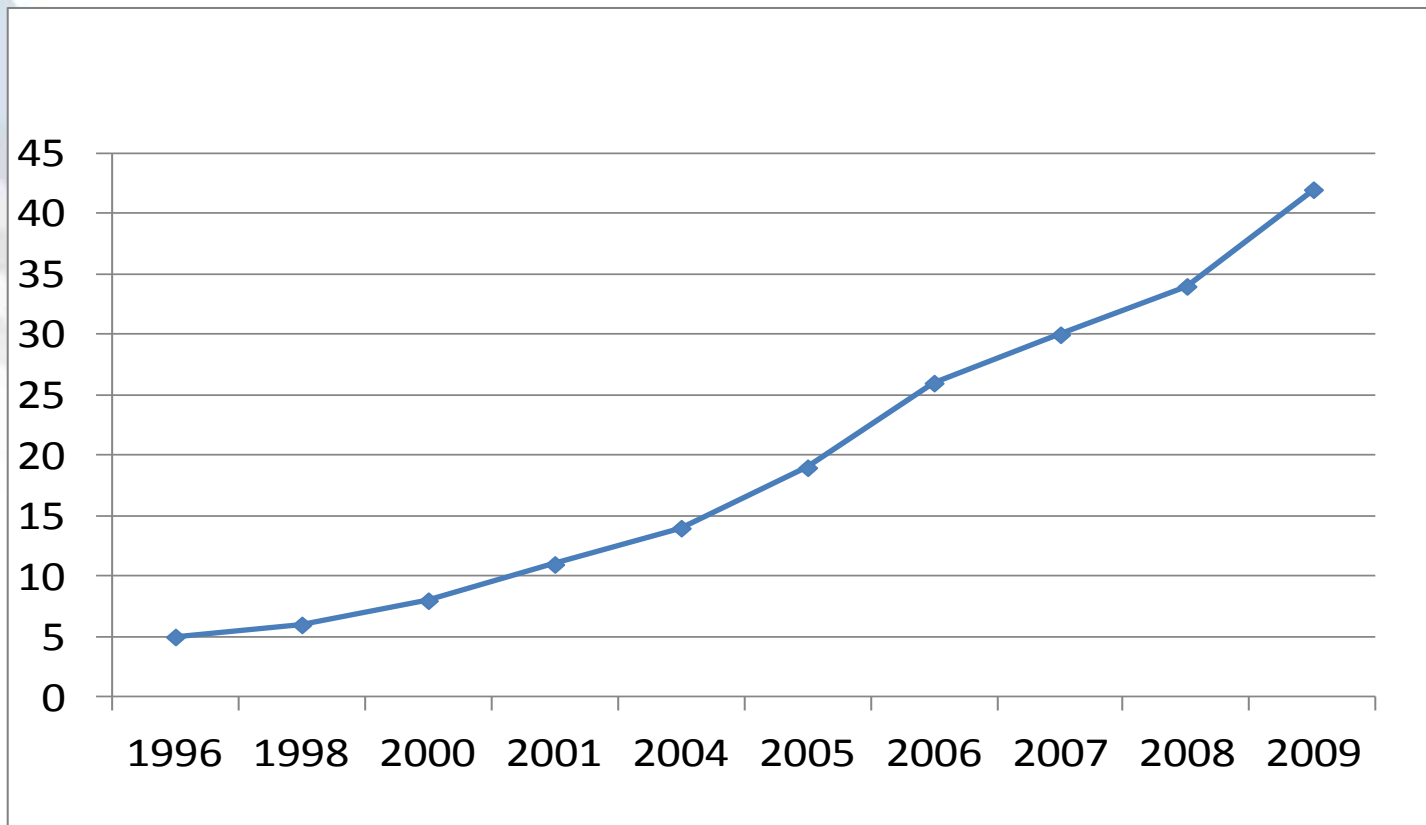
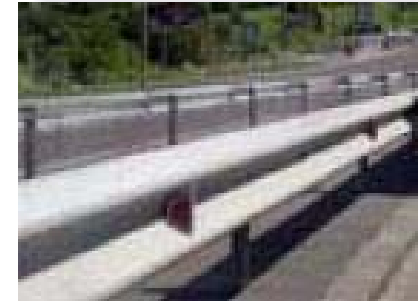
Expanding Galvanizing Markets - India



High
Mast
Lighting
Column



Number of Russian HDG plants increasing



Infrastructure seminars for government & private sectors
Seminars at universities



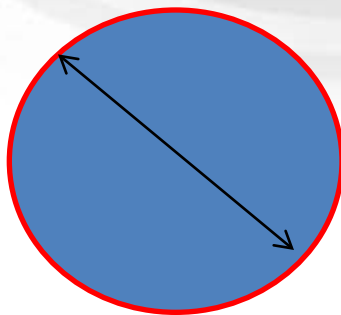
85% of growth in Zn usage will be growth in HDG usage

Resources developed: CFC Training Tool, www.galvanizingasia.com website, "World of Galvanizing" CD, "Galvanize" brochure 2/year, all with regional case studies

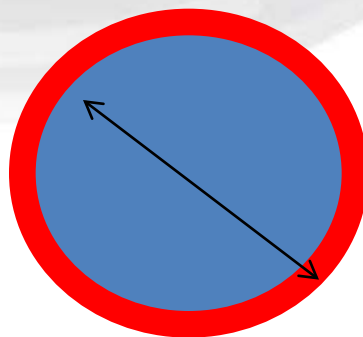




- Bell-shape instead of threaded couplings
- Sized to PVC standards, interchangeable with PVC pipe and fittings
- No cradles or expansion joints needed, only thrust blocks



114 mm HDG



104 mm PVC

Larger inside diameter saves
50% of pumping costs





- Demonstration crop trials
- Communication activities
- Country-based marketing



**Sichuan, China (2 locations):
rice grain yield increase = 20%**

Success in China

REALIZAÇÃO

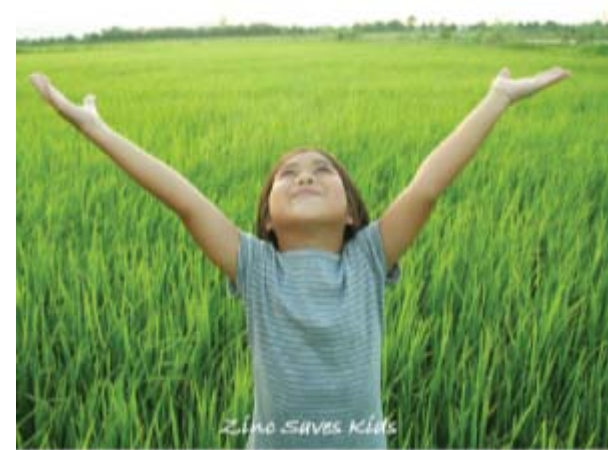


- IZA and China's Ministry of Agriculture have launched joint zinc fertilizer program
- End result: government recommendation for use of zinc in fertilizers...a market-changing event
- Plus over 400,000 field agents to help **“recommend”**





Zinc nutrient initiative



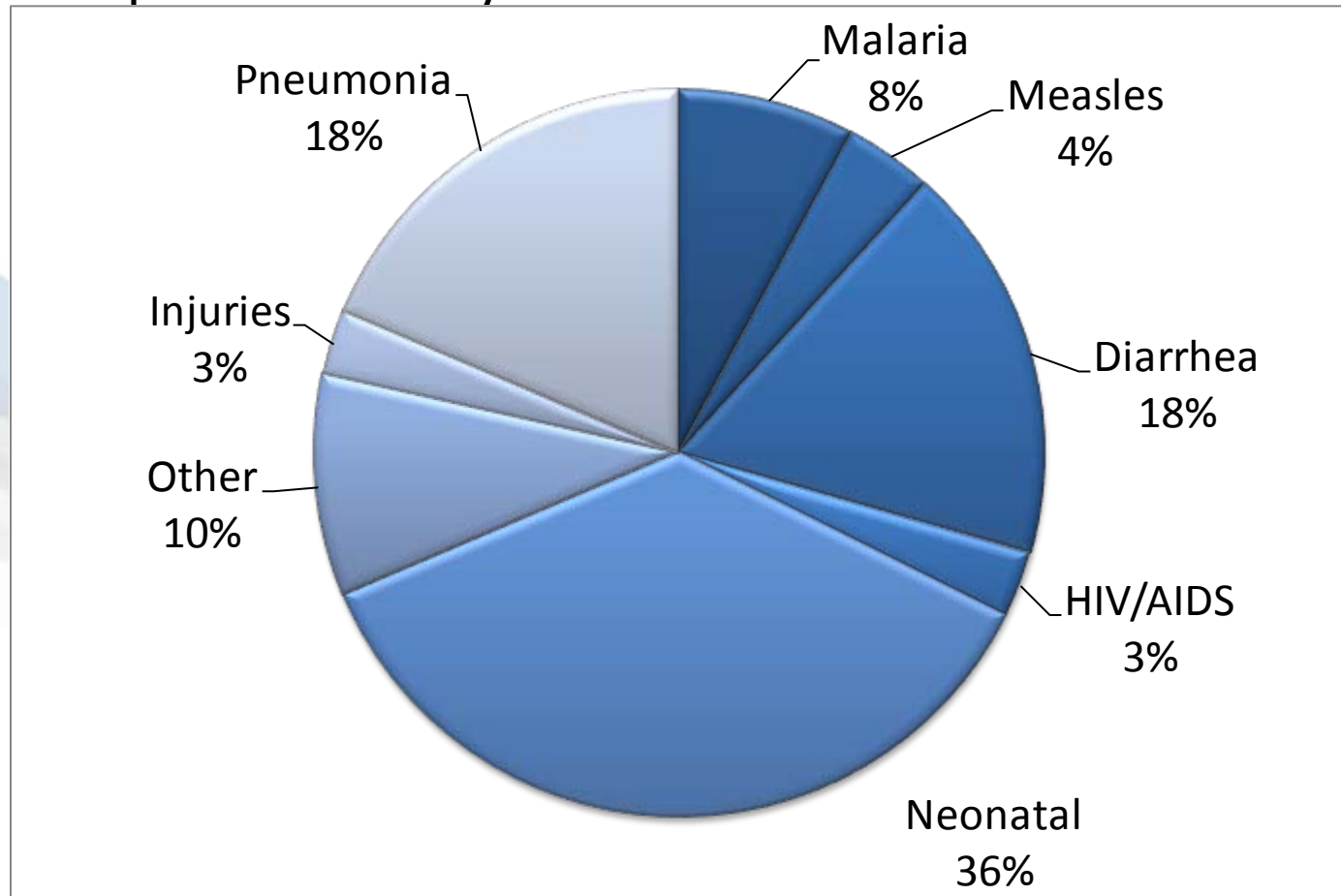
- Zinc fertilizer represents huge market potential which is now in site:
 - China... 300,000 tpy Zn
 - India... 200,000 tpy Zn
 - Brazil.... 60,000 tpy Zn
- ZNI activities already having an impact
- Benefits include increased food, nutrition, health, economics and zinc consumption

- One third of world's population is at risk of zinc deficiency
- 800,000 people of all ages estimated to die annually – WHO
- 450,000 children under the age of five die annually
- Lancet



Global Causes of Under 5 Child Deaths

18% of infant deaths are caused by Diarrhea, compared to 3% by AIDS!



Source: Bryce J. et al., Lancet 2005

20mg Zinc and ORS during
10-14 days to treat diarrhea

Costs: US\$ 0.50

Zinc-containing MNPs for
treatment and prevention of
malnutrition (“hidden hunger”)

Costs: US\$ 2 per child per year



The World Health Organization (WHO), UNICEF, and the International Zinc Nutrition Consultative Group (IZiNCG) proved beyond doubt the link between zinc deficiency and child mortality.



- Partnership program launched with UNICEF
- Zinc Industry contributing \$3 million over 3 years
- Programs started in Nepal & Peru





- Ministry of Health agreed to include zinc supplementation for diarrhea treatment in national regulations
- Field study on effects of zinc
- Anaemia reduced by 18%
- Regions: Lima, Cusco, Ayacucho, Huancavelica, Apurimac



Zinco Salva Crianças



Horsehead Corporation donates
"Unstoppable" proceeds to Zinc Saves Kids
[Read More...](#)

Zinc Saves Kids™
An International Zinc Association initiative in support of UNICEF

www.ZincSavesKids.org



- Good growth in galvanizing especially in Brazil
- Some high potential General Galvanizing Market Developments
- Zinc: It is Solving some World Problems