



# **“Importance of Latin America’s Contribution to the Global Supply of Copper, Lead, Zinc and Nickel and their By-product Metals”**

**Don Smale**

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**International Lead and Zinc Study Group**

**International Copper Study Group**

**International Nickel Study Group**

**EU- Latin America Dialogue on Raw Materials**

**Lima, Peru, 10-11 March 2014**

# INTERNATIONAL STUDY GROUPS

## INTRODUCTION

- Shared headquarters in Lisbon, Portugal, since 2006
- Intergovernmental organizations consisting of member governments plus the European Union representing metals producing and using countries
- **International Lead and Zinc Study Group:** established in 1959, has presently 30 members
- **International Copper Study Group:** established in 1992, has presently 24 members
- **International Nickel Study Group:** established in 1990, has presently 15 members

# STUDY GROUPS

## MAIN OBJECTIVES & FUNCTIONS

- To conduct **consultations** and **exchanges of information** on the international copper, nickel, lead & zinc economies.
- To improve **statistics** on these metals.
- To increase **market transparency**.
- To undertake **studies** on issues of interest to the Groups.
- To consider special problems or difficulties that exist or may arise in these **metal's international economies**.

The Study Groups endeavour to provide its membership with the most accurate, comprehensive and timely **information** on capacities, production, usage, trade, stocks, prices, technologies, research and development, and other areas that may influence the supply and demand for **copper, nickel, lead & zinc**.

# STUDY GROUPS

## FORUMS FOR DISCUSSION

- **Markets:** forecasts of supply and demand for metals a year ahead
- **Trade:** monitoring of international trade in metals
- **Environmental policy:** sharing information on approaches to regulation
- **Industry Advisory Panel:** metals industry executives provide input to member governments
- Invite **observer countries, industry and observer organizations** such as UNCTAD, World Bank, UNIDO, Common Fund for Commodities and metals associations

# ILZSG Membership

- Membership open to any country involved in lead and/or zinc production, usage, or trade.
- 30 members (>85% of global lead/zinc industry):

 **Australia**

 **Belgium**

 **Brazil**

 **Bulgaria**

 **Canada**

 **China**

 **Finland**

 **France**

 **Germany**

 **India**

 **Iran**

 **Ireland**

 **Italy**

 **Japan**

 **Korea Rep.**

 **Mexico**

 **Morocco**

 **Namibia**

 **Netherlands**

 **Norway**

 **Peru**

 **Poland**

 **Portugal**

 **Russian Fed.**

 **Serbia**

 **South Africa**

 **Sweden**

 **Thailand**

 **United States**

 **European  
Community**

# ICSG Membership

- Membership open to any country involved in copper production, usage, or trade.
- 24 member governments (>80% of global copper industry)



# INSG Member Countries

 Australia

 Brazil

 Cuba

 European Union

 Finland

 France

 Germany

 Greece

 Italy

 Japan

 Norway

 Portugal

 Russian  
Federation

 Sweden

 United  
Kingdom

# ILZSG Main Publications

50% Discount

For companies  
based in member  
countries

- **Lead and Zinc Statistics: ILZSG's Monthly Statistical Bulletin**
- **Lead and Zinc New Mine and Smelter Projects 2013**
- **Study on Chinese Zn First Use Market 2012**
- **The By-Products of Copper, Zinc, Lead and Nickel**
- **Indian Lead Market 2012**
- **The Market for Lead: Fundamentals Driving Change 2012**
- **World Directory: Primary and Secondary Lead Plants 2011**
- **Environment and Health Controls on Lead 2011**
- **Environment and Health Controls on Zinc 2011**
- **China Lead Acid Battery Market** (prepared for ILZSG by BGRIMM)
- **China Zinc Recycling Industry** (prepared for ILZSG by BGRIMM)



# ICSG Main Outputs

**Copper Bulletin** (monthly): includes annual and monthly statistics, by country, on copper mine, smelter, refined and semis production, copper usage and trade, as well as stocks and exchange prices, providing a global view of supply and demand.

**Statistical Yearbook** : As above, covering the past 10 years.

**ICSG Online Statistical Database**: The ICSG maintains one of the world's most complete historical and current databases with statistics on copper production capacities, data on copper production, consumption, stocks, prices, recycling and trade for copper products.

**Monthly Press Release** on the state of the copper market and **Forecast Press Release** presenting twice a year ICSG forecasts for the copper market (to be included in the email distribution list please contact [mail@icsg.org](mailto:mail@icsg.org))

**Copper Factbook**: The Factbook provides a broad overview of all facets of copper, from production to trade, usage, recycling and more. It is designed to promote copper and educate readers about the importance and contribution of copper to society. Available on ICSG Website for download

**Directory of Copper & Copper Alloy Fabricators** (annual): provides a global overview of semis fabricators processing cathode and scrap into semi-finished products. The Directory covers wire rod plants, ingot makers, master alloy plants, brass mills, and electrodeposited copper foil mills.

**Special Reports**: ICSG undertakes regularly special reports on topics of interest to the copper Industry/Governments (list available in ICSG website)



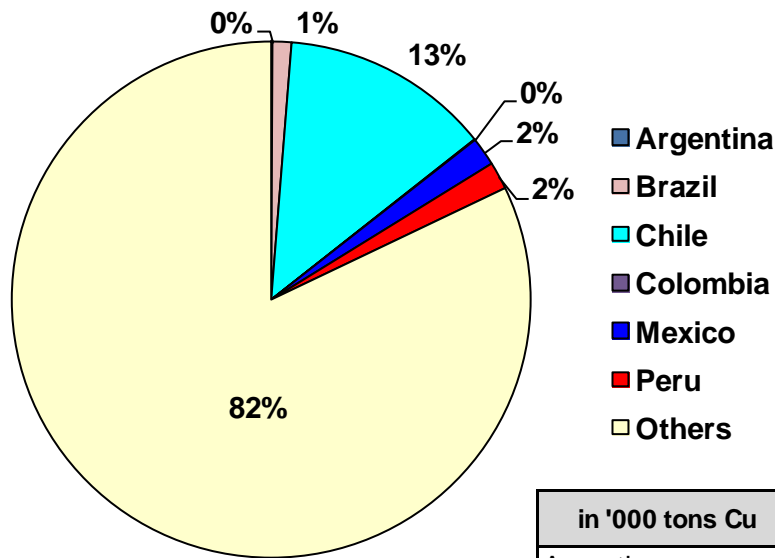
## Next Study Group Meetings in Lisbon, Portugal

- **31 March - 1 April 2014** International Copper Study Group
- **Morning 2 April 2014** International Lead and Zinc Study Group
- **2.00pm 2 April 2014** Joint Study Groups Seminar *“The Mining and Metals Industry in Europe”*
- **3-4 April 2014** International Nickel Study Group

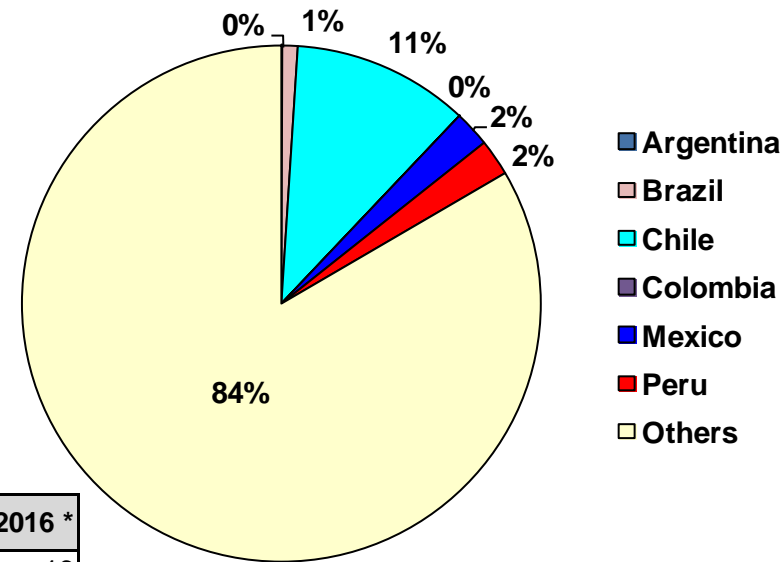
# Copper Refined Production

## Latin America Countries vs World

2013 share in  
World Production



2016 share in  
World Production \*



in '000 tons Cu	2013	2016 *
Argentina	16	16
Brazil	249	280
Chile	2,753	3,222
Colombia	10	10
Mexico	373	656
Peru	361	663
Others	17,245	24,328
<b>World</b>	<b>21,007</b>	<b>29,165</b>
<b>Latin America</b>	<b>3,763</b>	<b>4,841</b>
<b>share in World</b>	<b>18%</b>	<b>17%</b>

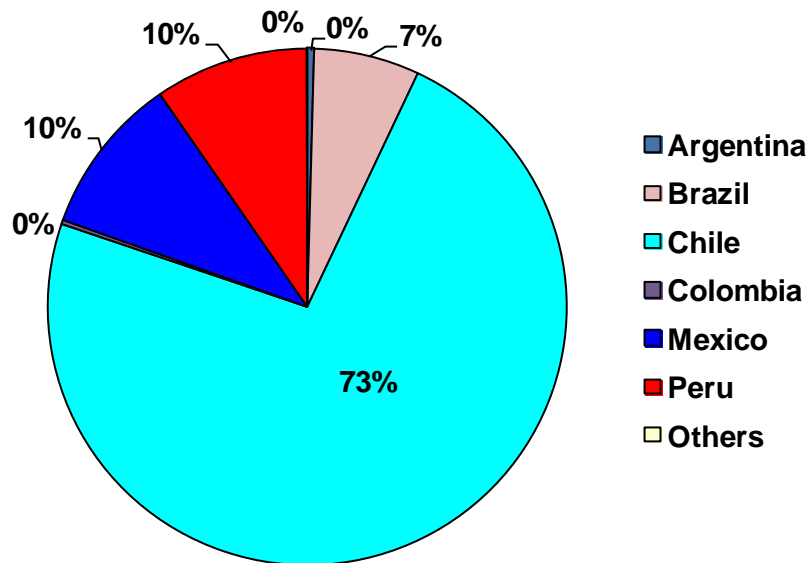
\* Based on expected production capacity

Note: In the last 5 years, global refineries have operated at an average of 79% of the reported capacity

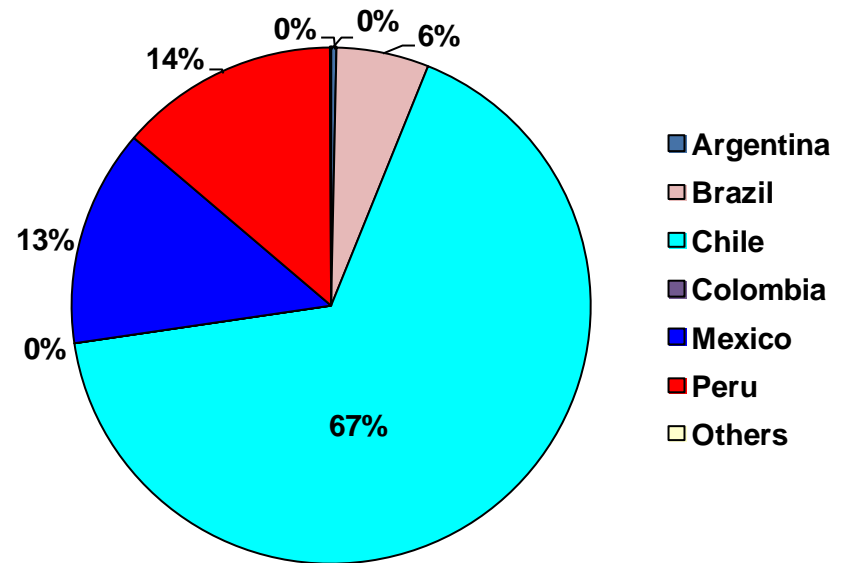
# Copper Refined Production

## Latin America Countries vs Latin America

2013 share in Latin America Production



2016 share in Latin America Production \*

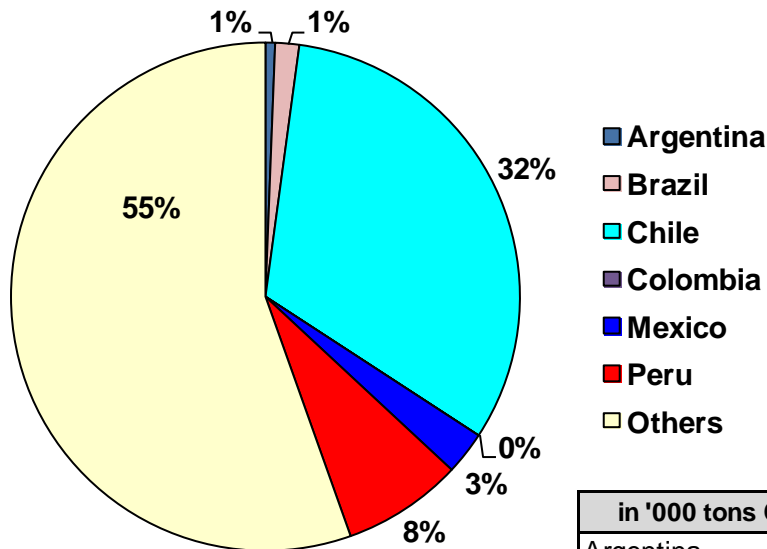


\* Based on expected production capacity

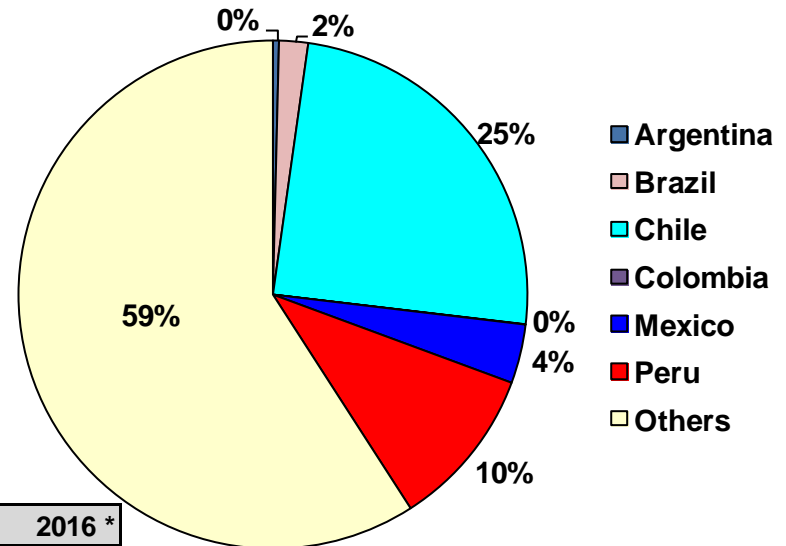
# Copper Mine Production

## Latin America Countries vs World

2013 share in  
World Production



2016 share in  
World Production \*



in '000 tons Cu	2013	2016 *
Argentina	110	100
Brazil	275	483
Chile	5,776	6,458
Colombia	1	5
Mexico	492	983
Peru	1,376	2,689
Others	9,986	15,488
<b>World</b>	<b>18,015</b>	<b>26,206</b>
<b>Latin America</b>	<b>8,050</b>	<b>10,802</b>
<b>share in World</b>	<b>45%</b>	<b>41%</b>

\* Based on expected production capacity

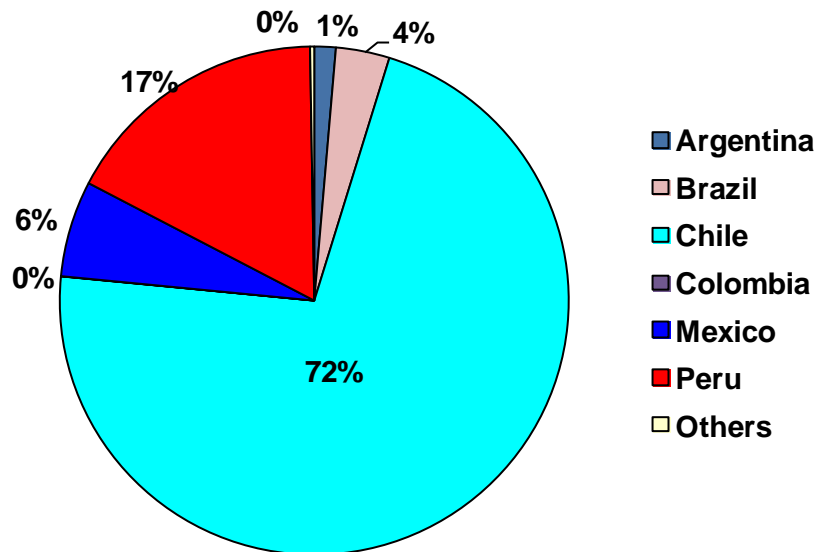
\* Based on expected production capacity

Note: In the last 5 years, global mines have operated at an average of 83% of the reported capacity

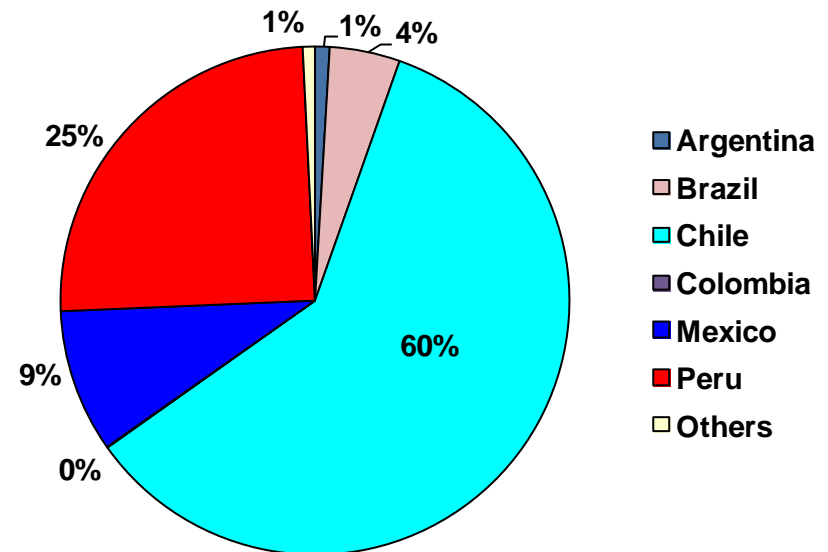
# Copper Mine Production

## Latin America Countries vs Latin America

2013 share in Latin America Production

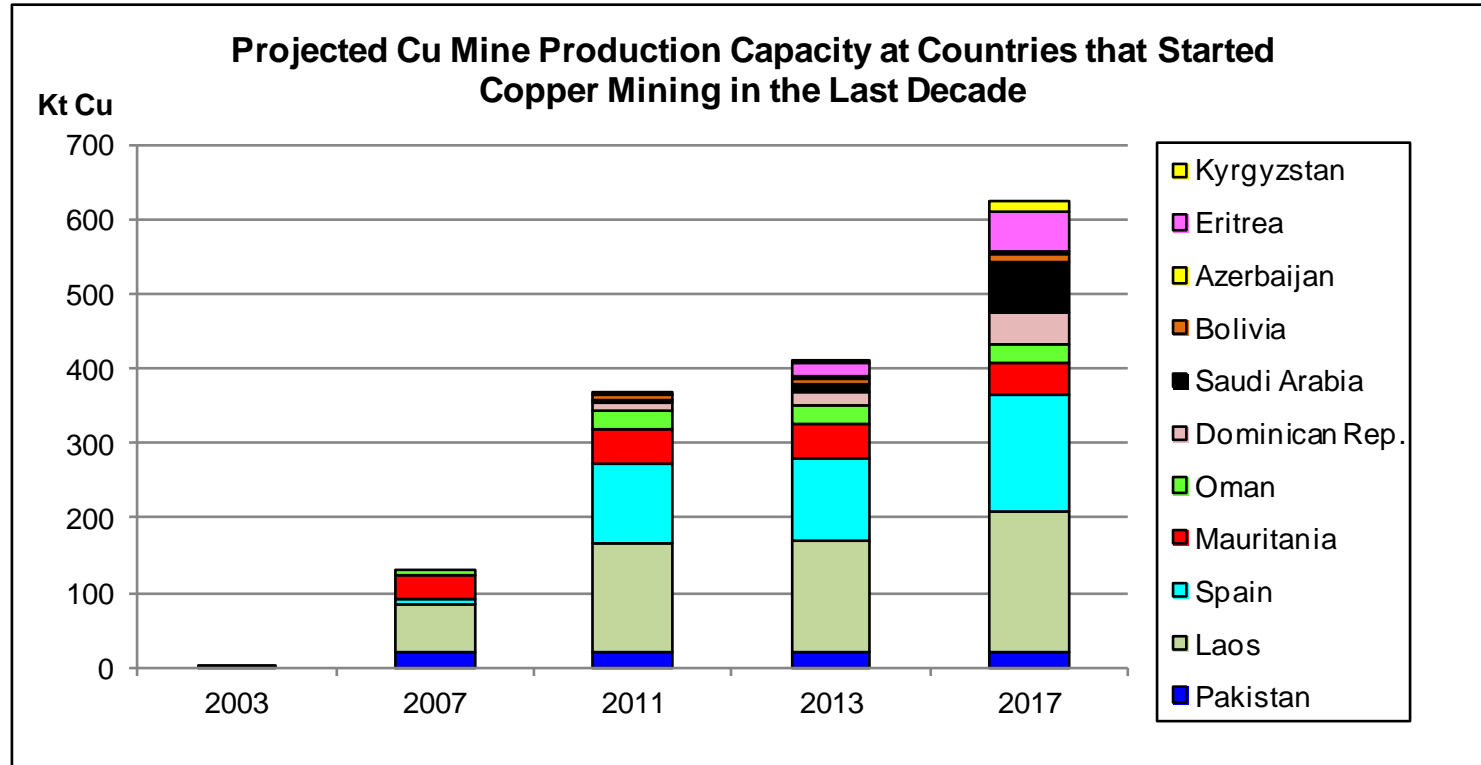


2016 share in Latin America Production \*



\* Based on expected production capacity

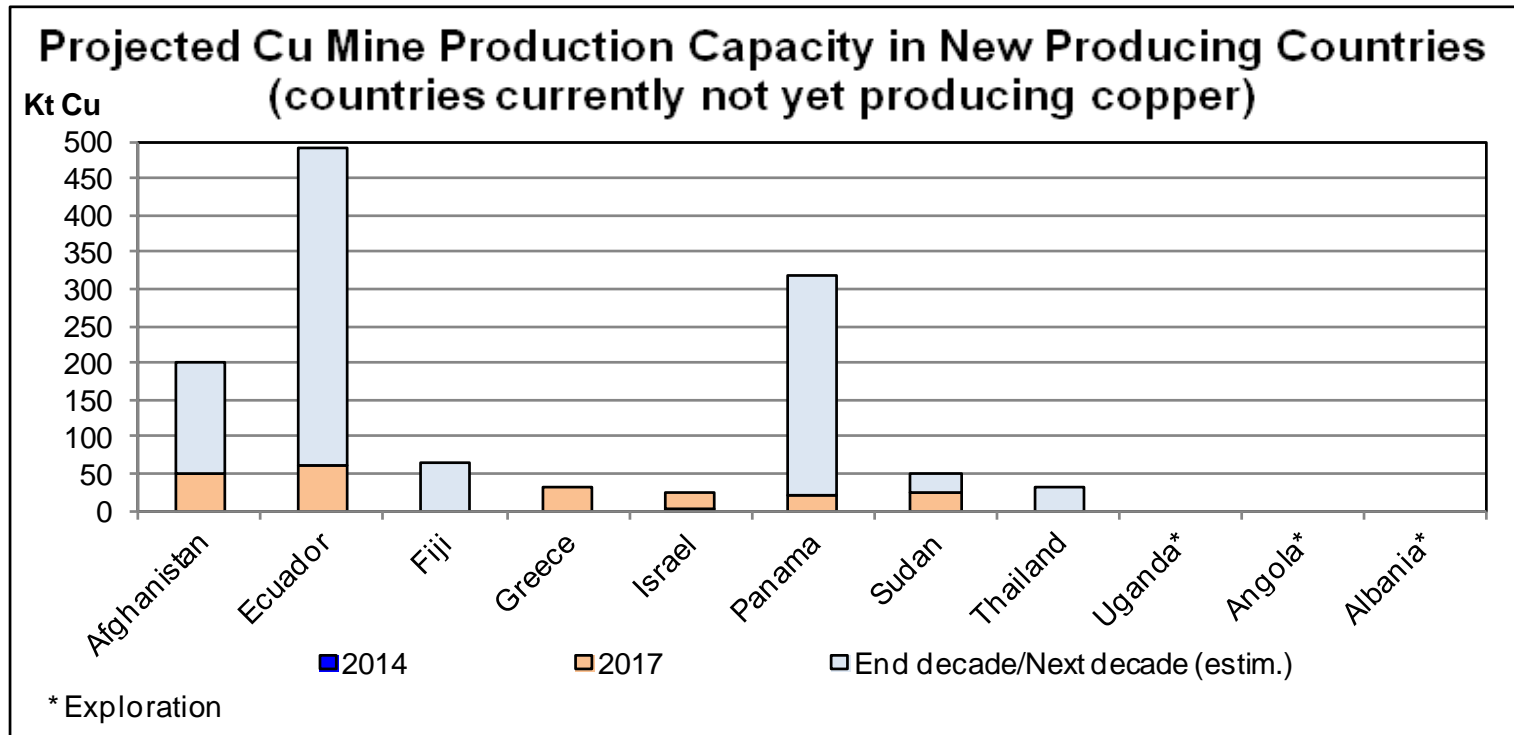
# Copper Mine Production



**New countries emerged, last decade, in Latin America as copper mine producers: Dominican Republic and Bolivia \***

\* Based on expected production

# Copper Mine Production



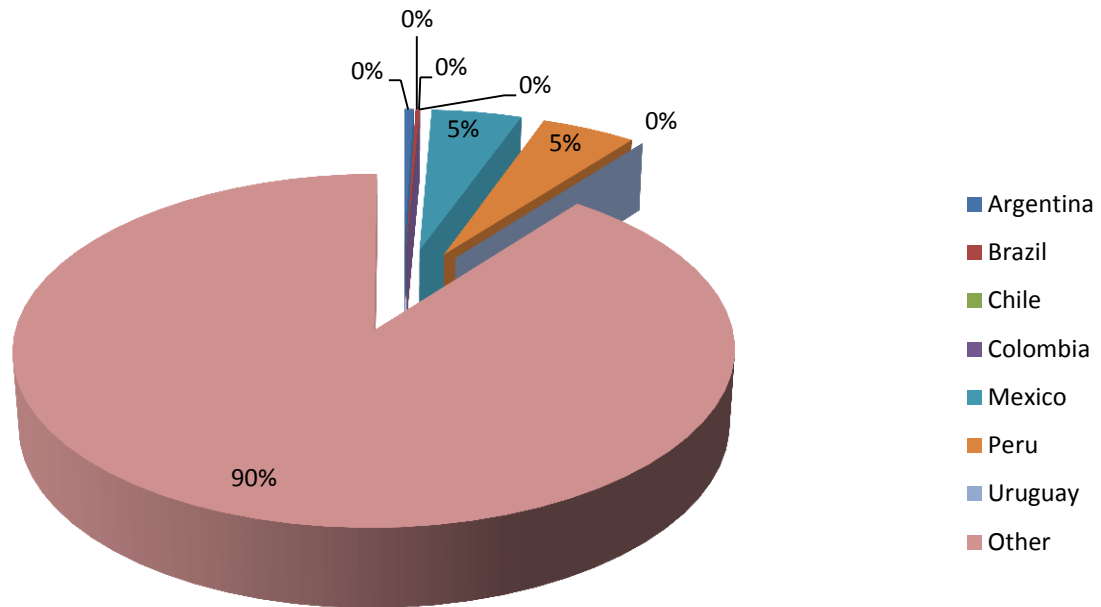
**New countries will potentially emerge in Latin America as significant copper mine producers: Panama and Ecuador \***

\* Based on expected production capacity



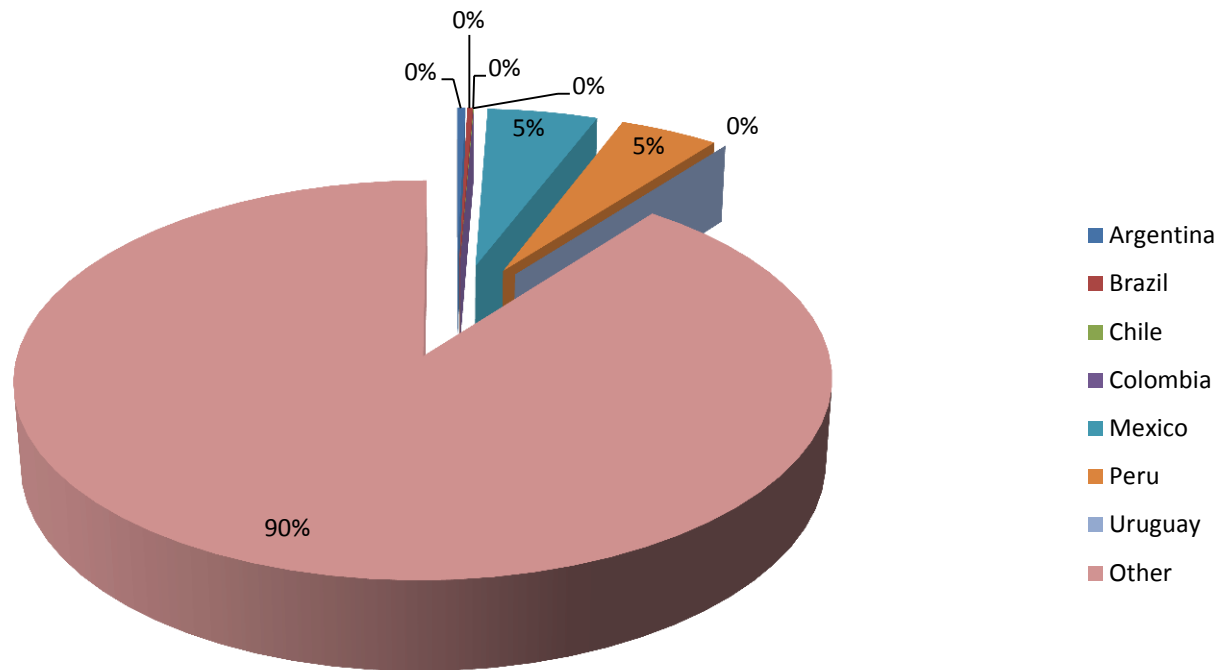
## Lead Mine Output 2013

### Selected Latin American Countries



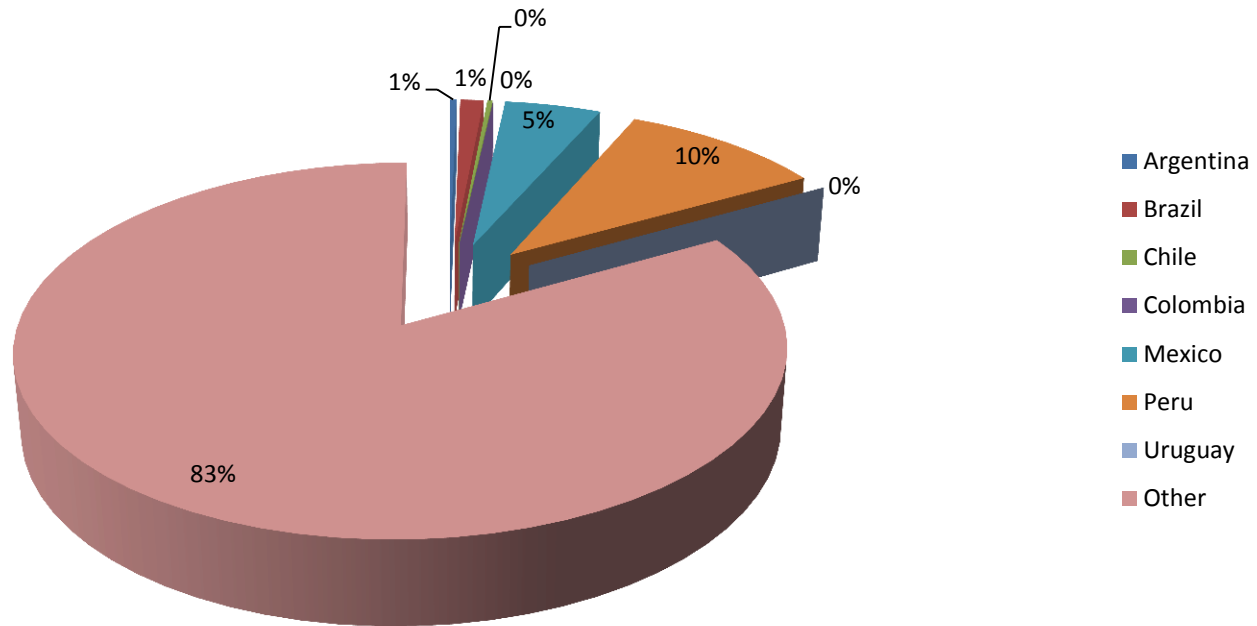
## Lead Mine Output 2016

### Selected Latin American Countries



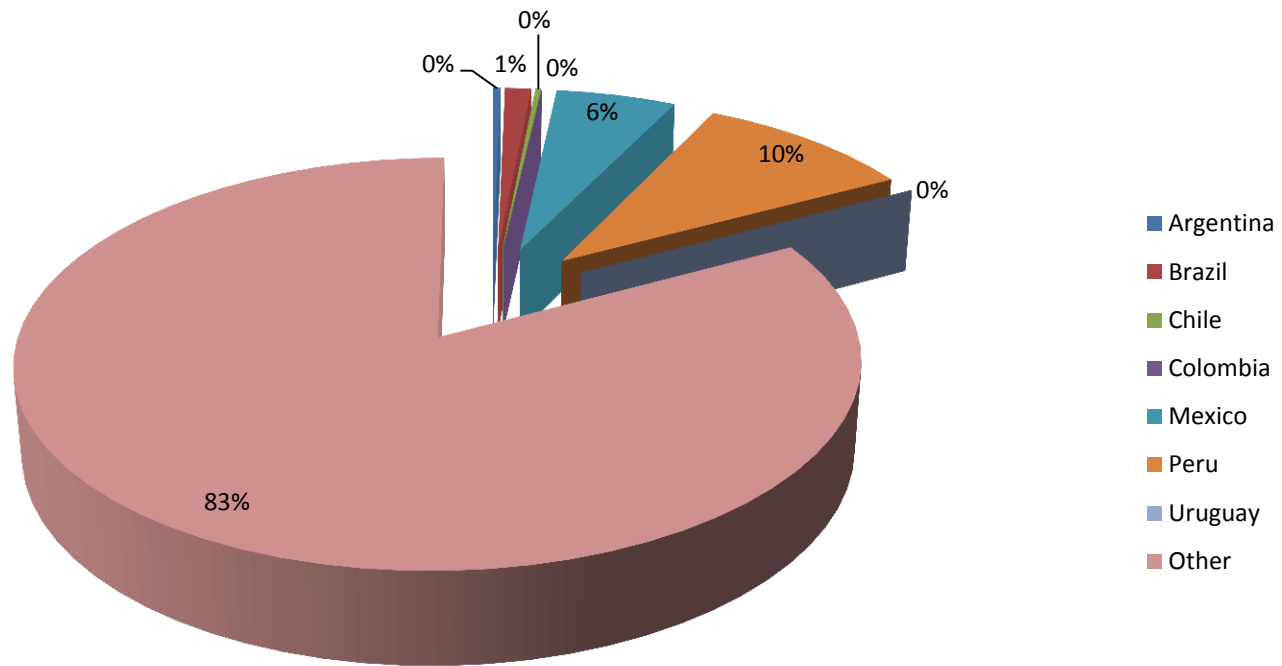
## Zinc Mine Output 2013

### Selected Latin American Countries



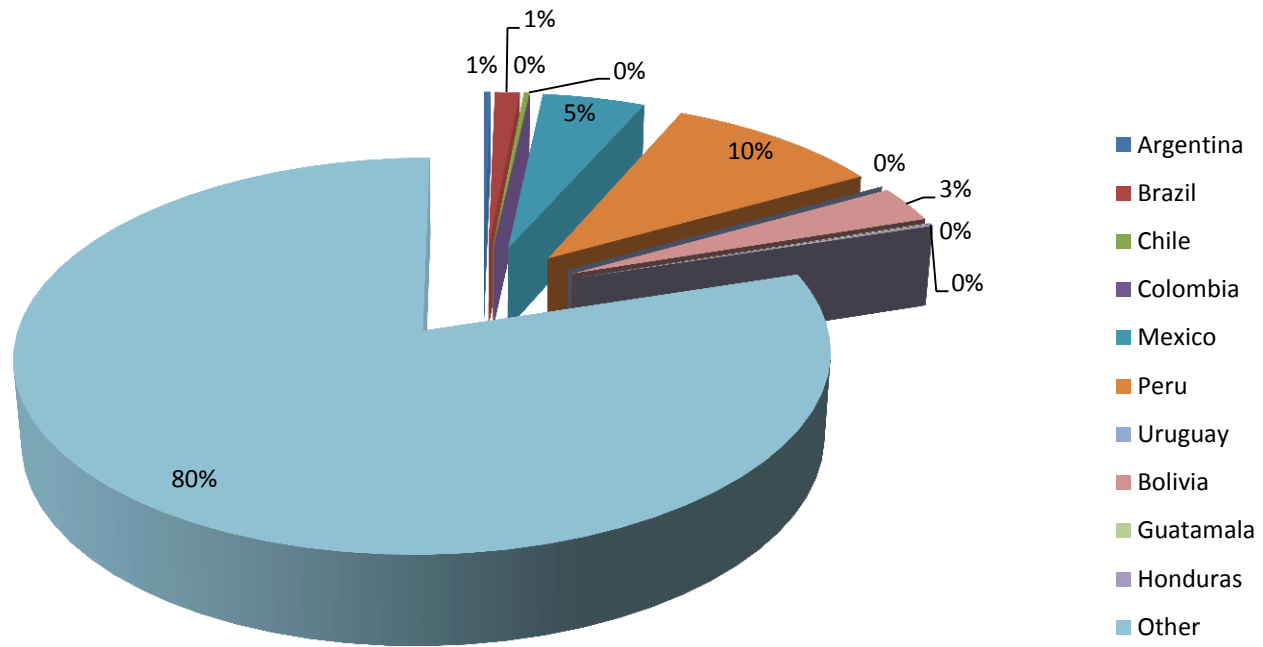
## Zinc Mine Output 2016

### Selected Latin American Countries



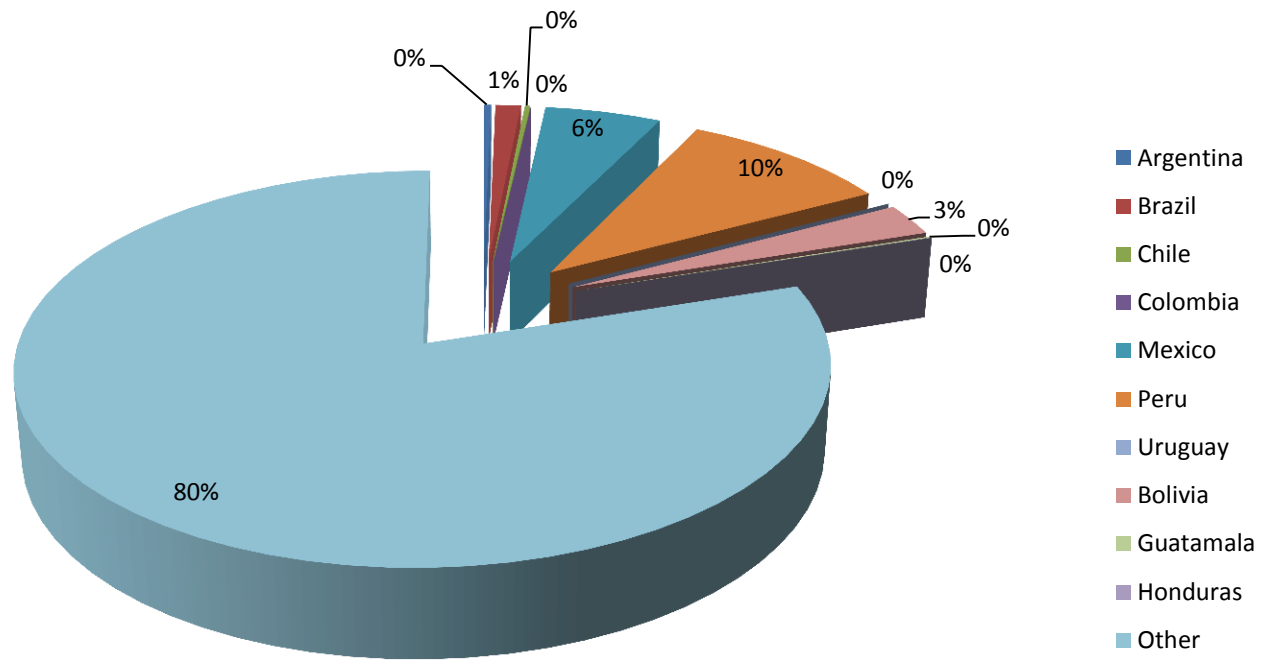
## Zinc Mine Output 2013

### Total Latin America



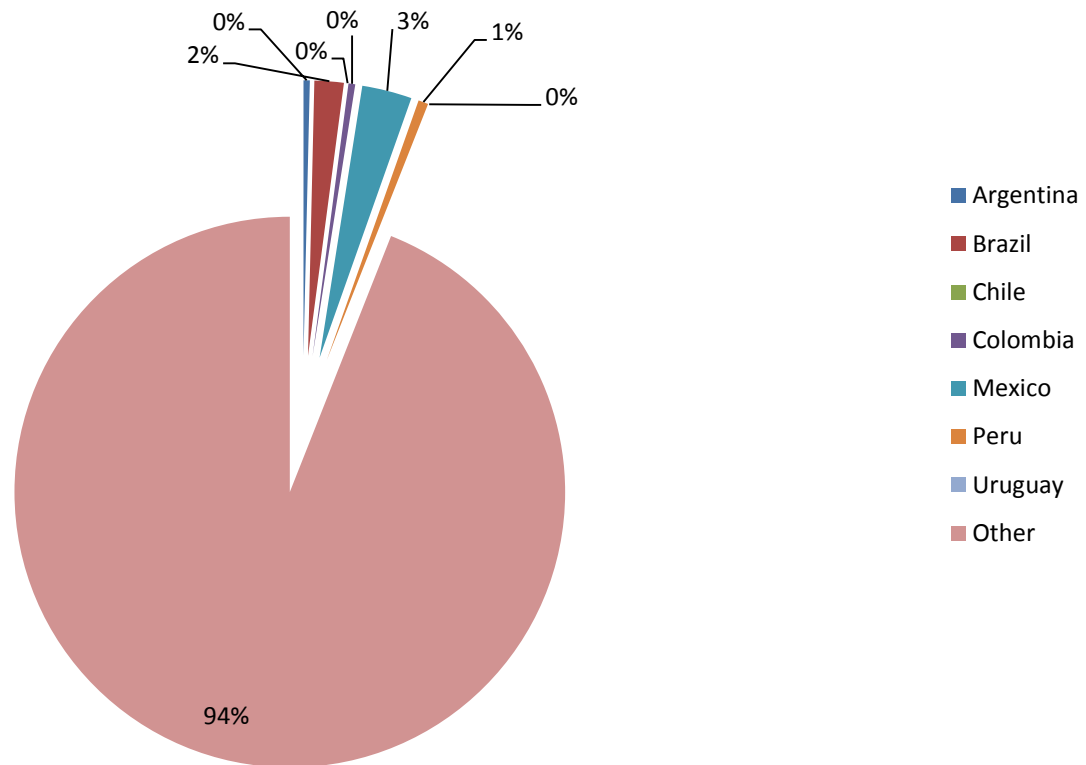
## Zinc Mine Output 2016

### Total Latin America



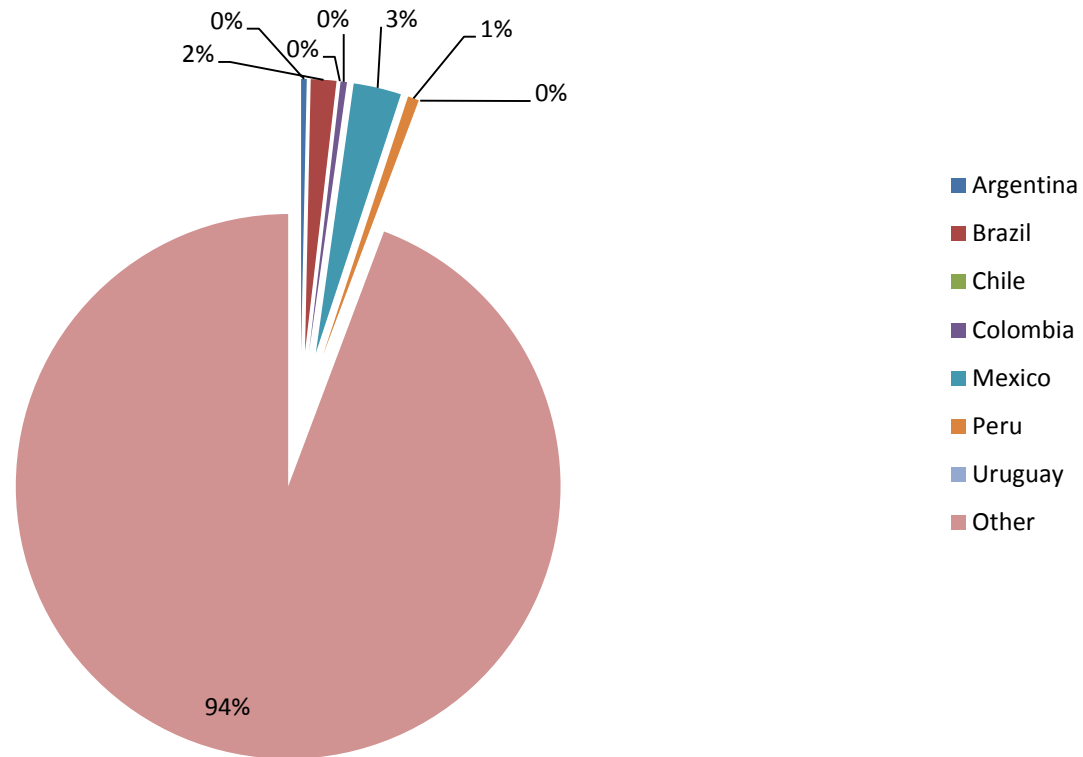
## Lead Metal 2013

### Selected Latin American Countries



## Lead Metal 2016

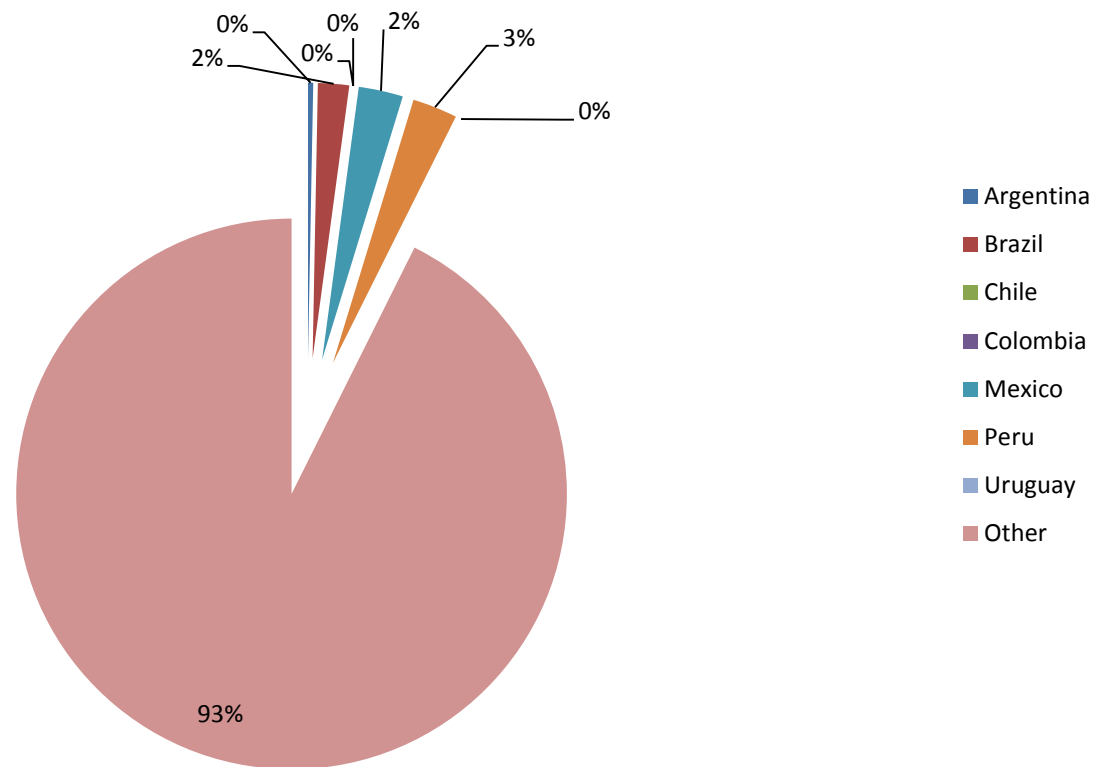
### Selected Latin American Countries





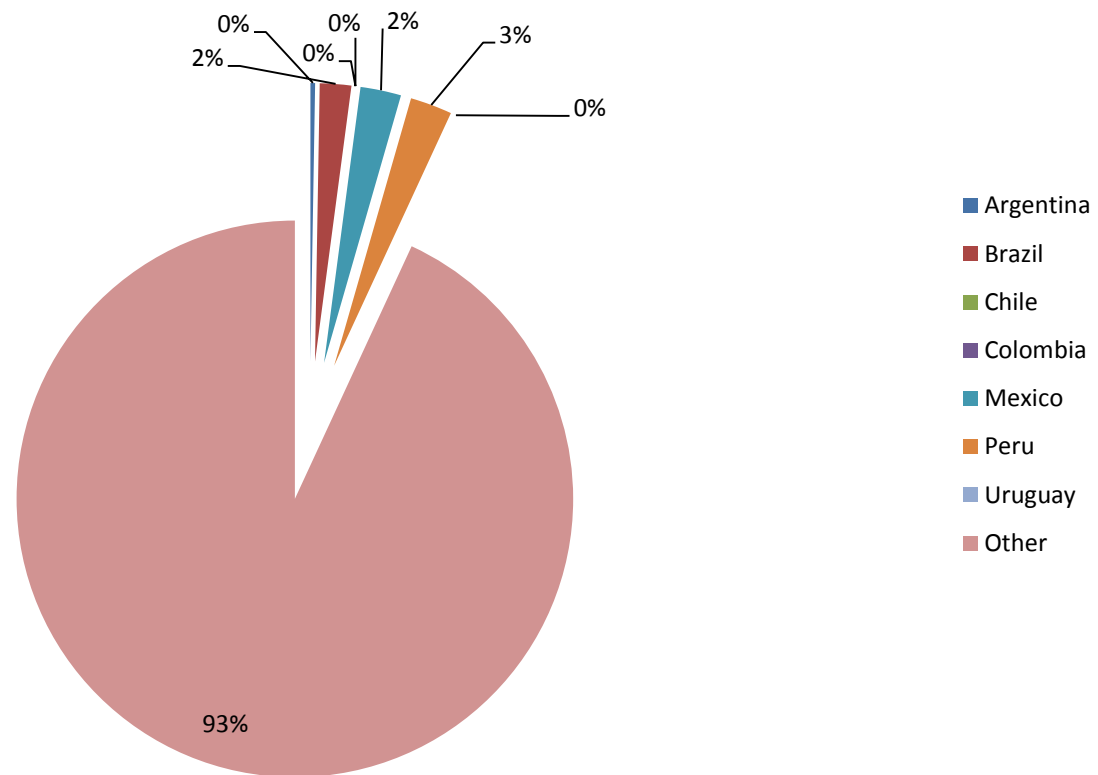
## Zinc Metal 2013

### Selected Latin American Countries



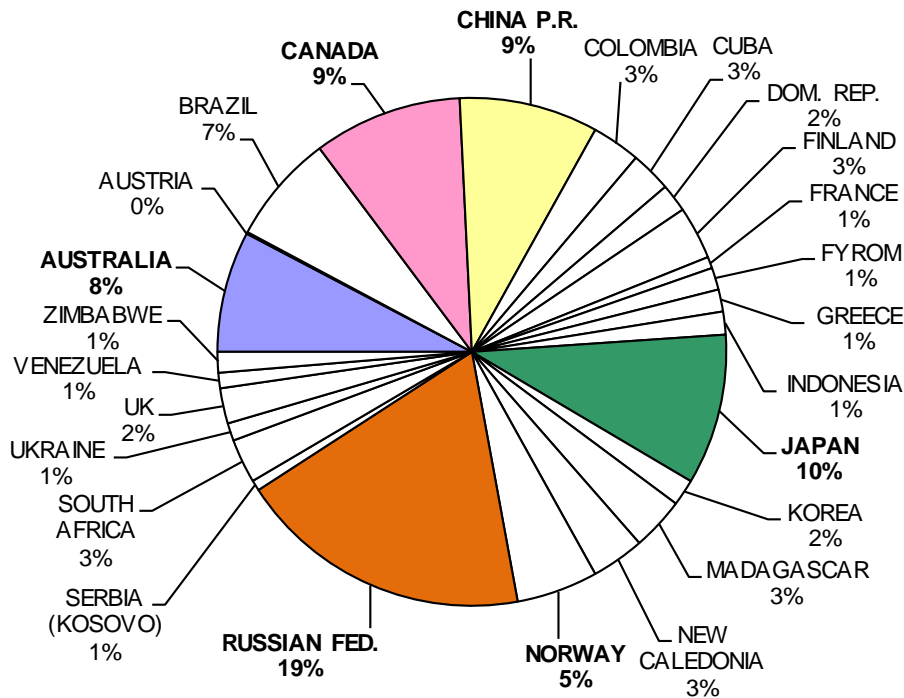
## Zinc Metal 2016

### Selected Latin American Countries

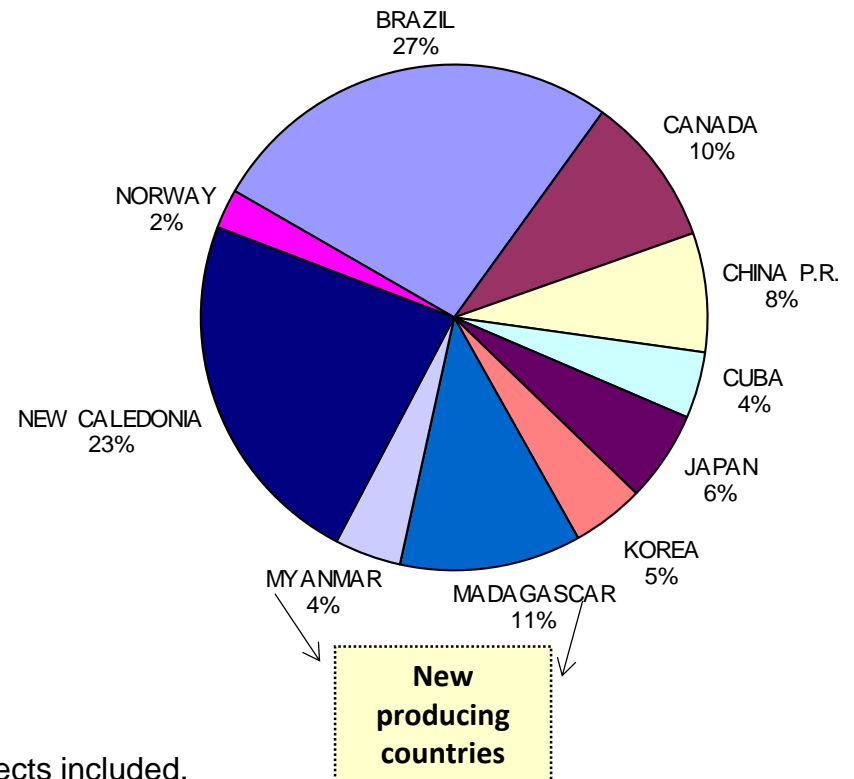


# Primary Nickel Capacity by Country

2012:  $\approx 1.8\text{Mt}$



New committed developments:  
 $\approx 0.5\text{Mt}$



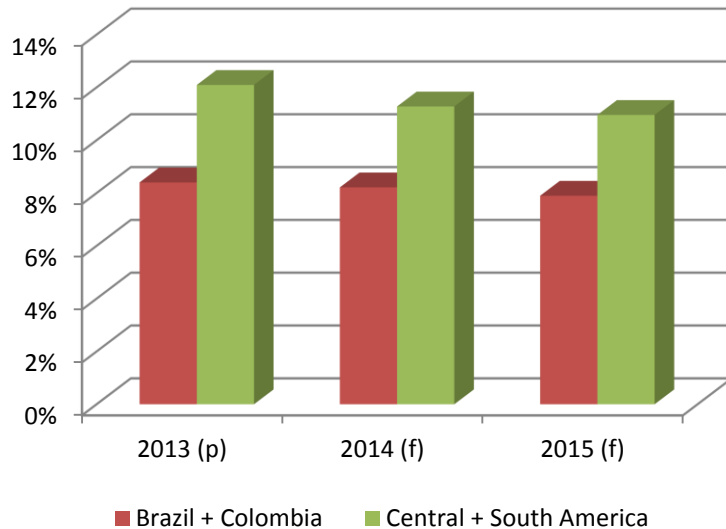
Note: no Chinese NPI projects included.

# New Nickel Capacity on Stream / Ramp Up - 2014

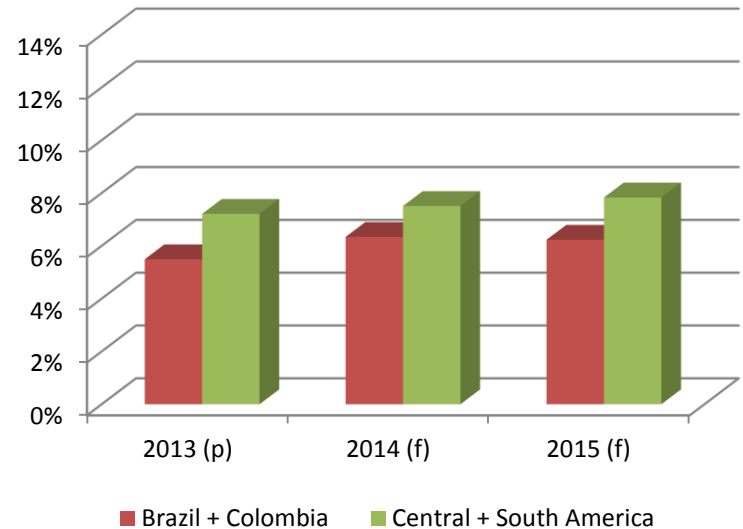
Project Name / Country	Product	Mode	Estimated Production	Projected Total Production	Remarks
Ambatovy / Madagascar	Class I	Ramp Up	≈ 40 000	60 000	Open market
Long Harbour / Canada	Class I	Start Up	≈ 10 000	50 000	Mainly replacement
Tagaung Taung / Myanmar	FeNi	Start Up	≈ 15 000	22 000	China
Koniambo / New Caledonia	FeNi	Start Up	≈ 26 000	60 000	Open market
Onça Puma / Brazil	FeNi	Ramp Up	≈ 12 000	58 000	Open market
Barro Alto / Brazil	FeNi	Ramp Up	≈ 25 000	36 000	Open market
Goro / New Caledonia	Semi / Class I	Ramp Up	≈ 25 000	60 000	Australia & China
Ramu / PNG	Semi	Ramp Up	≈ 20 000	30 000	China & Other
Talvivaara / Finland	Semi	Ramp Up	≈ 15 000	35 000	Finland
Raventhorpe / Australia	Semi	Ramp Up	≈ 35 000	39 000	Australia & Other
Taganito / The Philippines	Semi	Start Up	≈ 20 000	30 000	Japan
Santa Rita / Brazil	Conc.	Ramp Up	≈ 20 000	25 000	Brazil & Finland
Kevitsa / Finland	Conc.	Ramp Up	≈ 10 000	10 000	Open market

Note: no Chinese NPI projects included.

### Nickel Mine Production



### Primary Nickel Production



- Guatemala restarted mining in 2012 and may start producing FeNi later this year
- Brazil: Onça Puma ramping up but Barro Alto will rebuild 2 furnaces
- Dominican Rep. (2014) and Venezuela stopped producing

- The Indonesian legislation on nickel ore export restrictions, what effect will that have on ore availability in China and NPI in the near and medium future?
- Building up of NPI capacity in Indonesia, what effect will that have on nickel prices, NPI production in China and the world nickel supply/demand balance in coming years?
- High world nickel stocks, particularly LME, what effect will that have on nickel prices and availability of primary nickel in coming years?

# Joint Report on By-Product Metals

- Information on the by-product metals of copper, zinc, lead and nickel published in a *Report* and a *Directory*
- Metals covered: bismuth, germanium, indium, cobalt, platinum group metals, scandium, molybdenum, rhenium, selenium, tellurium and rare earth elements
- Data on sources, refinery processes, recycling, markets, contracts, pricing, uses, government regulations, REACH status of compounds, government stockpiles and trade restrictions

# Joint Report on By-Product Metals

World production of the by-product metals and the principal metals (*2011 estimates*)

Principal Metal	Mine Production (tonnes)	By-product Metal	Production (tonnes)
Lead	4,500,000	Bismuth	8,500
Zinc	12,400,000	Germanium*	118
		Indium*	640
Nickel	1,800,000	Cobalt	98,000
		Platinum Group Metals	472
		Scandium*	10 <sup>#</sup>
Copper	16,100,000	Cobalt	98,000
		Molybdenum	250,000
		Rhenium	46 <sup>#</sup>
		Selenium*	2,600 <sup>#</sup>
		Tellurium*	450 <sup>#</sup>
		Rare Earth Elements	130,000



# By-Product Metals in Latin America

The Joint Study Group Report and Directory provide information on the following metals from Latin American Producers

- Bismuth
- Indium
- Cobalt
- Molybdenum
- Rhenium
- Selenium
- Tellurium
- Rare Earth Elements

# By-Product Metals in Latin America

**Latin American Countries identified in the Directory include**

- **Argentina**
- **Bolivia**
- **Brazil**
- **Chile**
- **Cuba**
- **Mexico**
- **Peru**

**Other sources indicate that by-product metals resources exist in**

- **Columbia (Cobalt)**
- **Dominican Republic (Cobalt)**

# By-Product Metals in Latin America

## An example of a by-product metal – Indium

In the Western world (excluding China & CIS) ~ 1000 MT Indium mined

- 25-30% of Indium mined yearly becomes refined indium
  - 25-30% accumulates in residues
  - 40-50% goes to non-Indium-capable refineries and is (now) lost
- 
- *Indium extraction is still currently inefficient and can be expanded*
  - *Indium is often found in combination with Zn and Pb*
  - *Ores in Bolivia and Peru have relatively high Indium content*

*Source: Indium Corporation figures*

# By-Product Metals in Latin America

## Bismuth

➤	Mexico	Grupo Penoles	
➤	Peru	Xstrata	Antamina Mine
➤	Peru	Doe Run	La Oroya
➤	Brazil	Verena Minerals Corp	

## Indium

➤	Brazil	Votorantim	Tres Marias
➤	Bolivia	SOAM (South American Silver Corp)	Ag-In-Ga-Cu-Pb

## Cobalt

➤	Brazil	Mirabela Nickel	Santa Rita Mine
➤	Brazil	Votorantim Metais Niquel S.A.	
➤	Cuba	Moa Nickel & Sherritt International Corp	
➤	Cuba	Cubaniquel	
➤	Mexico	Baja Mining/Korean Consortium	

# By-Product Metals in Latin America

## Molybdenum

➤	Argentina Alumbrera/Xstrata/Goldcorp/Yamana		
➤	Chile	Amerigo Resources Ltd	Minera Valle Central
➤	Chile	Anglo American/Falconbridge	Collahausi
➤	Chile	Antofagasta	Esperanza/ Telégrafo Sur
➤	Chile	Antofagasta/Minera	Los Pelambres
➤	Chile	Codelco	El Teniente / Andina
➤	Chile	Molibdenos y Metales SA (MOLYMET)	
➤	Mexico	Mercator Minerals Ltd	El Creston
➤	Mexico	Molymex SA de CV	
➤	Peru	Anglo American	Quellaveco/Michiquillay
➤	Peru	Freeport-McMoRan	Cerro Verde II
➤	Peru	Southern Copper	Toquepala/Cuajone

# By-Product Metals in Latin America

## Molybdenum Future Projects

➤	Argentina	Lumina Copper Corp	Taca Taca
➤	Argentina	Yamana Gold Inc	Agua Rica
➤	Chile	Pan Pacific Copper	Caserones
➤	Chile	KGHM, Sumitomo	Serra Gorda
➤	Chile	Teck	Andacollo Expansion
➤	Peru	Aluminum Corp. of China (CHINALCO)	Toromocho
➤	Peru	Anglo American	Los Bronces Expansion & Quellaveco
➤	Peru	China Minmetals /Jiangxi Copper	El Galeno
➤	Peru	Mercator Minerals	Creston
➤	Peru	SCC - Southern Copper	Cuajone & Toquepala Expansions
➤	Peru	Xstrata	Las Bambas

# By-Product Metals in Latin America

## Rhenium

➤	Chile	Teck Codelco	Chuquicamata
➤	Chile	Molymet	Disputada and Los Pelambres
➤	Mexico	Mexicana de Cobre	La Caridad
➤	Mexico	Molymex	Maria
➤	Peru	Southern Copper	Mine

## Rhenium Future Projects

➤	Chile	Xstrata	Altonorte Metallurgical Facility
➤	Chile	Molymet	Production

# By-Product Metals in Latin America

## Selenium

➤	Chile	Codelco	Chuquicamata Refinery
➤	Chile	Cormiqium	Lonquen Facility
➤	Peru	Southern Copper	

## Tellurium

➤	Chile	Anglo-American/Xstrata/Mitsui and Nippon	Collahuasi
➤	Chile	Codelco	Chuquicamata Refinery/Codelco Norte
➤	Peru	Doe Run	Oroya Smelter
➤	Mexico	Mexivada Mining	La Bambolla & AuroTellurio



# By-Product Metals in Latin America

## Rare Earth Elements

- Brazil Industrias Nucleares do Brasil SA Buena Norte
- Brazil CBMM Morro Dos Seis Lagos
- Brazil Mitsubishi/Neo Material Technoliges Inc/Mineracao Taboca SA Pitinga
- Brazil MBAC Fertilizer Araxá

# By-Product Metals in Latin America

Latin American production is significant, especially in Molybdenum and Rhenium

Metal	Latin American Production (mt) (%)		Global Production (mt)
Bismuth	1,112	(9.4)	11,744
Cobalt	4,969	(5.4)	91,039
Molybdenum	80,096	(31.9)	251,186
New Molybdenum Projects	15,200	(33.7)	45,000
Rhenium	28,000	(59.5)	47,000
New Rhenium Projects	6,500	(36.7)	17,700
Selenium (refined)	195	(8.6)	2,265
Rare Earth Elements	10,500	(9.0)	116,175

*Data from Joint Directory – Figures for 2011. Note that not all projects reported production for 2011. Future projects are intended capacity.*



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