

- ❖ La información contenida en esta presentación, es de propiedad del Instituto Geológico, Minero y Metalúrgico – INGEMMET, y no podrá ser reproducida o divulgada, total ni parcialmente, excepto previa autorización por escrito del INGEMMET. Todos los derechos y/o títulos de propiedad intelectual están reservados.
- ❖ Esta información ha sido obtenida de fuentes consideradas confiables y con autorización expresa del INGEMMET dentro del marco de sus funciones; sin embargo; recomendamos contrastar los niveles de precisión de la fuente informativa con el objetivo de su correcta aplicación.
- ❖ The information contained in this presentation is proprietary to the Geological Mining and Metallurgical Institute- INGEMMET, and shall not be reproduced or disclosed in whole or part or used for any purpose, except when such user possesses direct written authorization from INGEMMET. All rights and/or titles to any intellectual property are reserved.
- ❖ This information has been obtained from sources deemed reliable and with the express permission of INGEMMET within the framework of their duties, however, we recommend to contrast the levels of accuracy of the information source for the purpose of its correct application.

Lima – Perú, Setiembre 2018

# METALLIC MINING POTENTIAL AND MINING EXPLORATION IMPACTS IN PERU



**Jorge ACOSTA ALE**

DIRECCIÓN DE RECURSOS MINERALES Y ENERGÉTICOS

Lima  
Setiembre, 2018

# Content

- Principal mines in Peru
- Metallogenic belts
- Record of metallic historical production
- Future mines
- Global exploration investment
- Local mining and exploration investment
- Portfolio Mining Construction Projects

# Principal Mines in Peru

More than  
39 mining  
operations



Fuente / Source: MEM.

\* Fuente / Source: USGS.

# Metallogenic belts Peru

Upper Cretaceous –Paleocene  
VMS Cu-Zn-Au: Tambo Grande

Epithermal Au:  
Yanacocha

Epithermal Au:  
Pierina

Eo-Miocene  
Polimetallic Skarns &  
Replacement Milpo  
Cerro de Pasco

Late-Middle Jurassic  
IOCGs Cu-Fe-Au:  
Marcona.

Au Veins: In  
Nasca & Palpa.

Upper Cretaceous  
Porphyry Cu-Mo:  
Caujone Toquepala

Miocene Porphyry Cu-  
Au: La Granja  
Michiquillay

Carboniferous-Permian  
Orogenic Au: Pataz

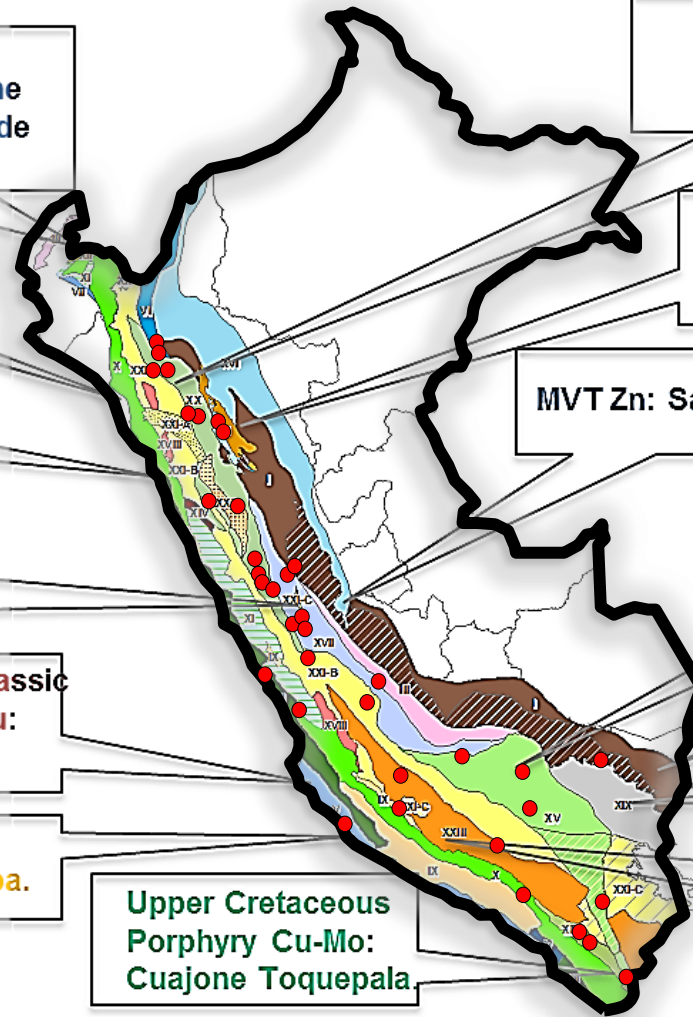
MVT Zn: San Vicente

Eocene Oligocene  
Porphyry Cu &  
Skarns: Las Bambas

Early Paleozoic Au  
Veins Rinconada

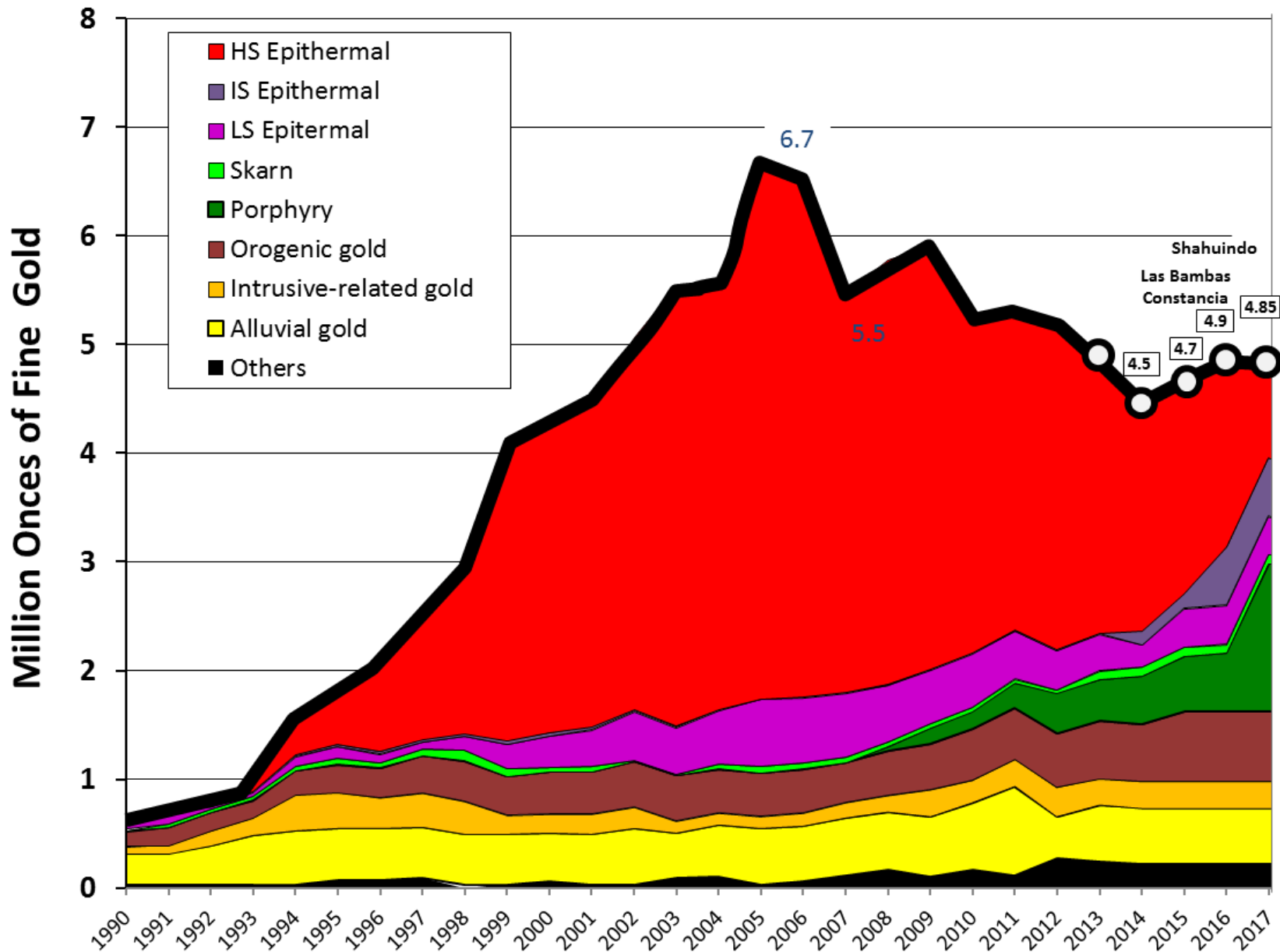
Oligo-Miocene  
Intrusive – related Sn  
Cu W : San Rafael

Mio-Pliocene  
Epithermal Au –Ag:  
Selene & Arcata.



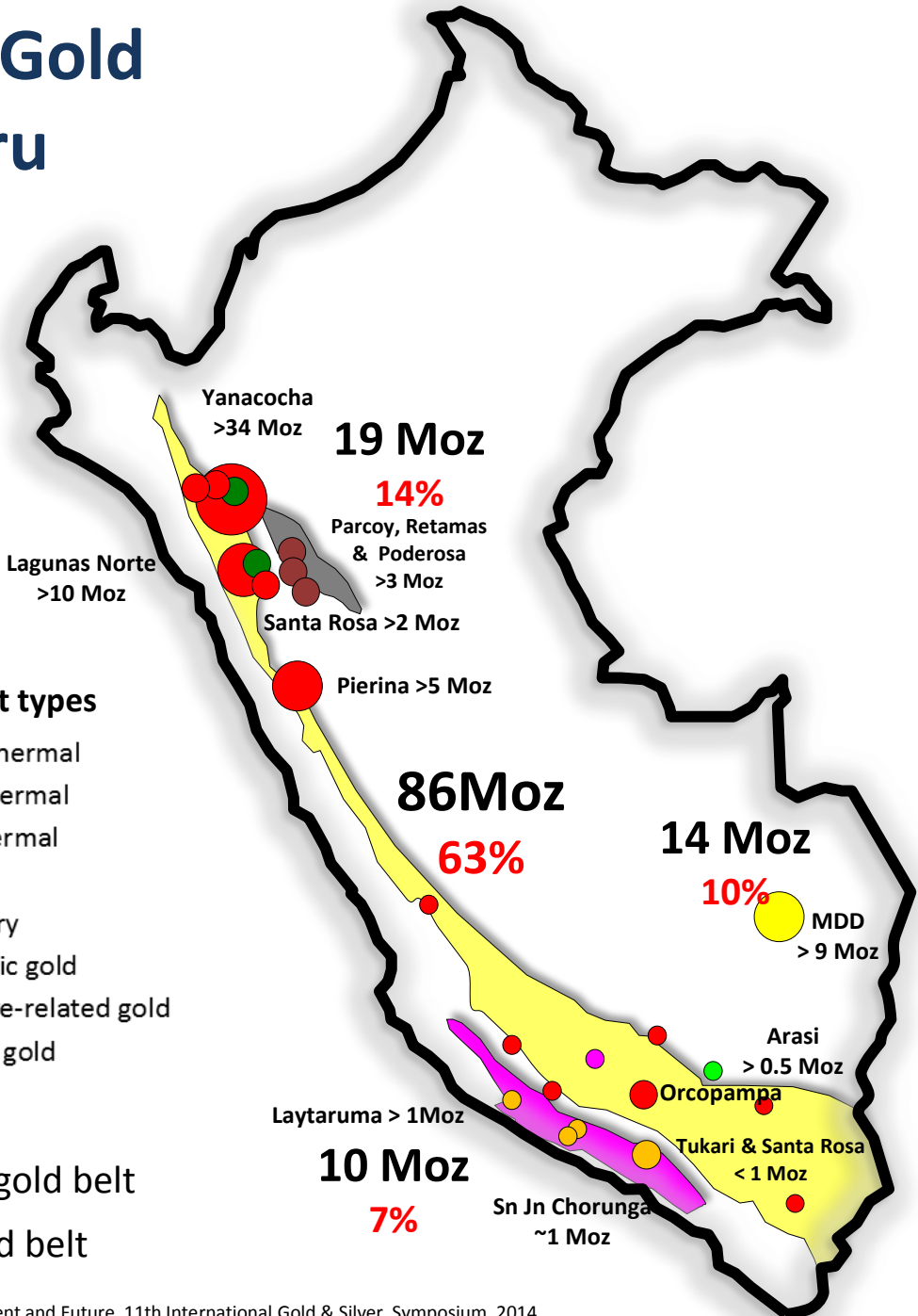
# Historical Metallic Production and Metallogenic belts

# Gold historical metallic production



# Historic Cumulative Gold Production in Peru

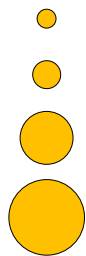
**Total Production in Peru**  
**~137 Moz (100%)**  
**Production from main gold belts**  
**115 Moz (84%)**  
**Other Au belts: 4 Moz (3%)**  
**Other non-Au belts: 18 Moz (13%)**



Million Ounces of Fine Gold

- < 1
- 5-1
- 30-5
- > 30

Mines



Deposit types

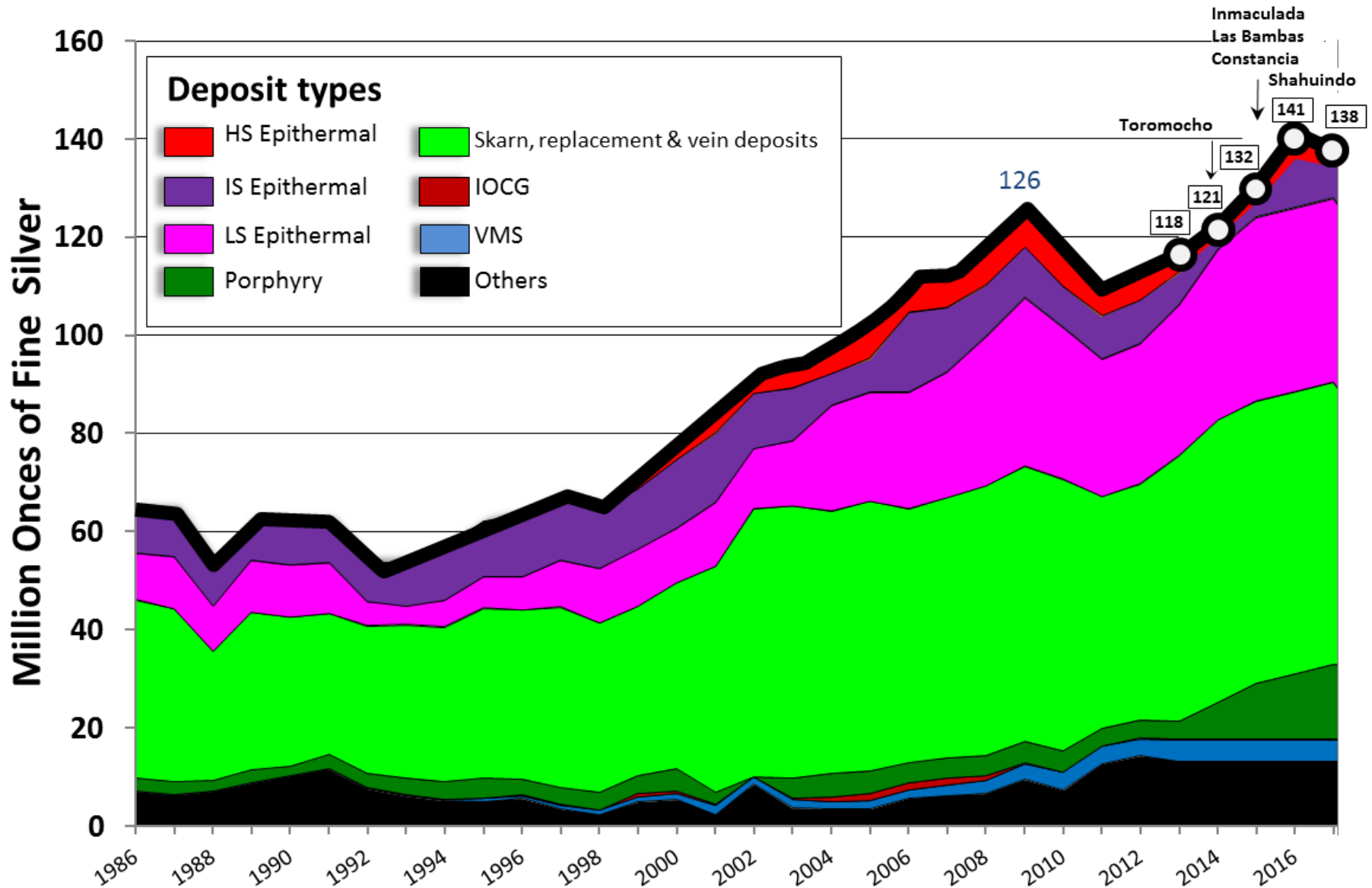
- HS Epithermal
- IS Epithermal
- LS Epithermal
- Skarn
- Porphyry
- Orogenic gold
- Intrusive-related gold
- Alluvial gold
- Others

**Metallogenic belts**

- Miocene epithermal belt
- Upper Cretaceous intrusion-related gold belt
- Carboniferous-Permian orogenic gold belt



# Silver historical metallic production



# Historic Cumulative Silver Production in Peru

**Total Production in Peru  
~6,097 Moz (100%)**  
**Production from main silver belts  
5,792 Moz (95%)**  
**Other non-Ag belts: 305 Moz (5%)**

Million Ounces  
of Fine Silver

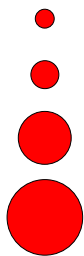
< 100

200-100

300-200

> 300

Mines



## Metallogenic belts



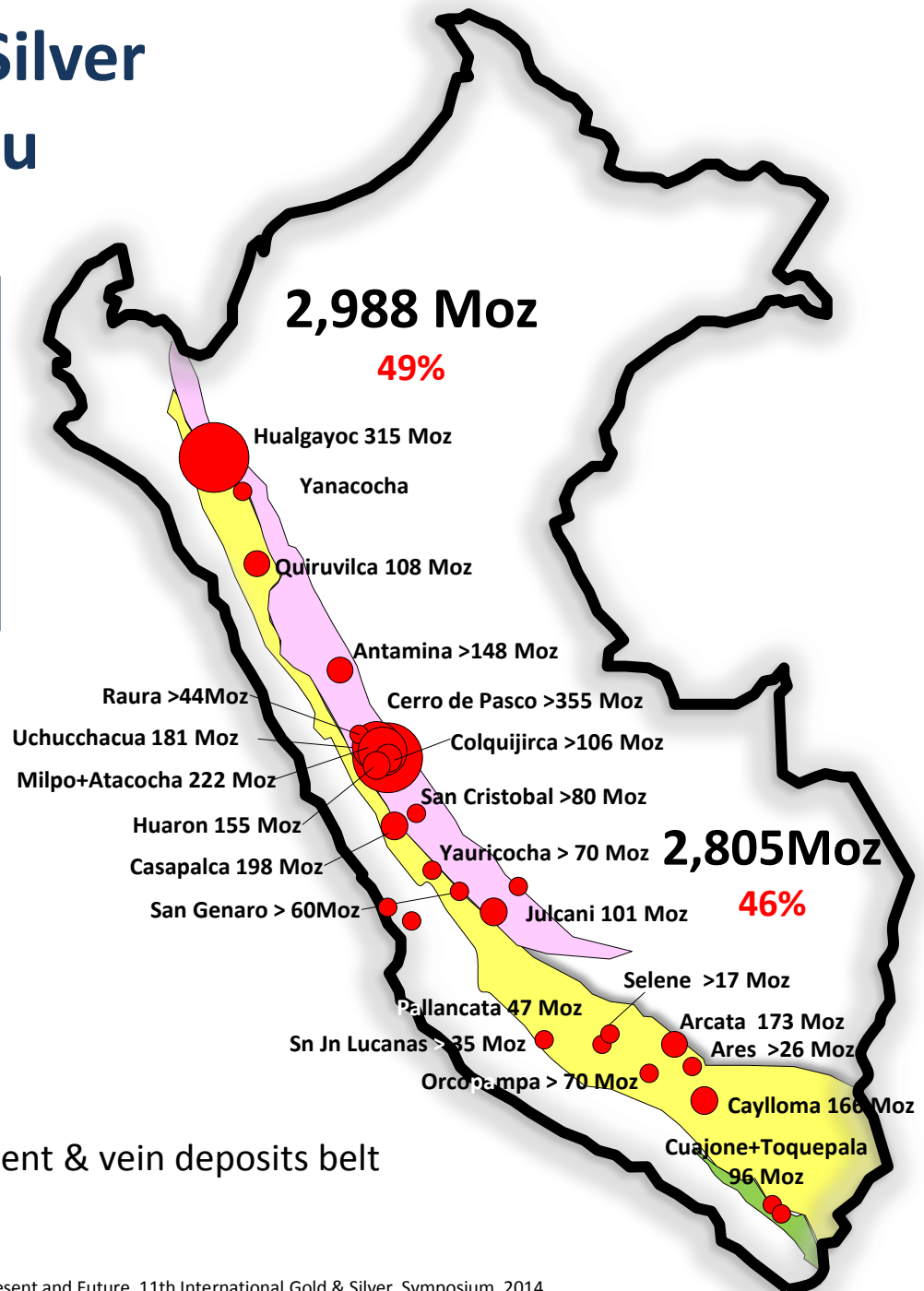
Miocene epithermal belt



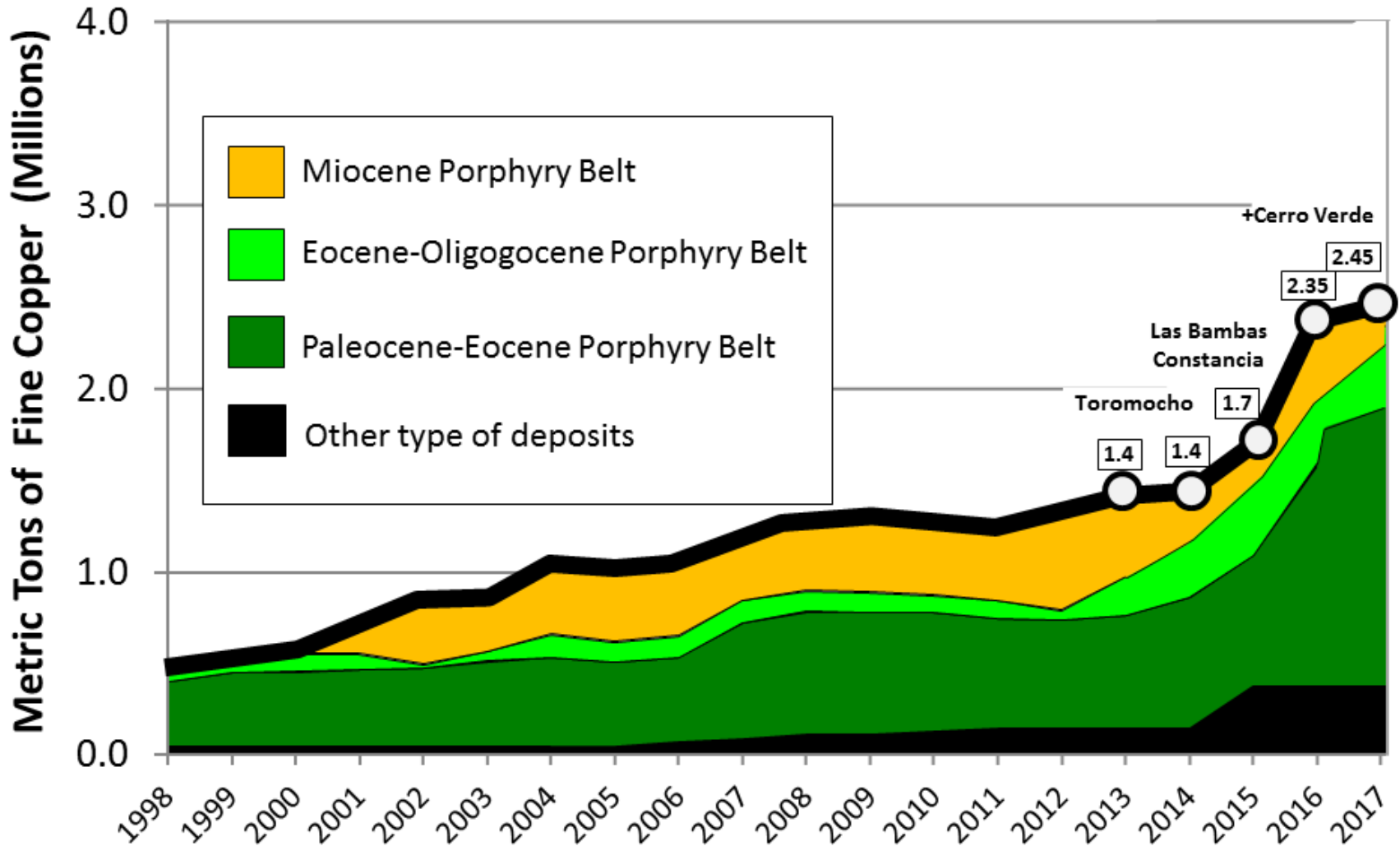
Miocene skarn, porphyry, replacement & vein deposits belt



Paleocene-Eocene porphyry belt



# Copper historical metallic production



# Historic Cumulative Copper Production in Peru

Total Production in Peru

~37 MMT (100%)

Production from main porphyry belts

30 MMT (82%)

Other Cu belts: 3 MMT (7%)

Other non-Cu belts: 4 MMT (11%)

Million Metric Tons  
of Fine copper

Mines

< 1



1-3



3-5



5-7



## Metallogenic belts



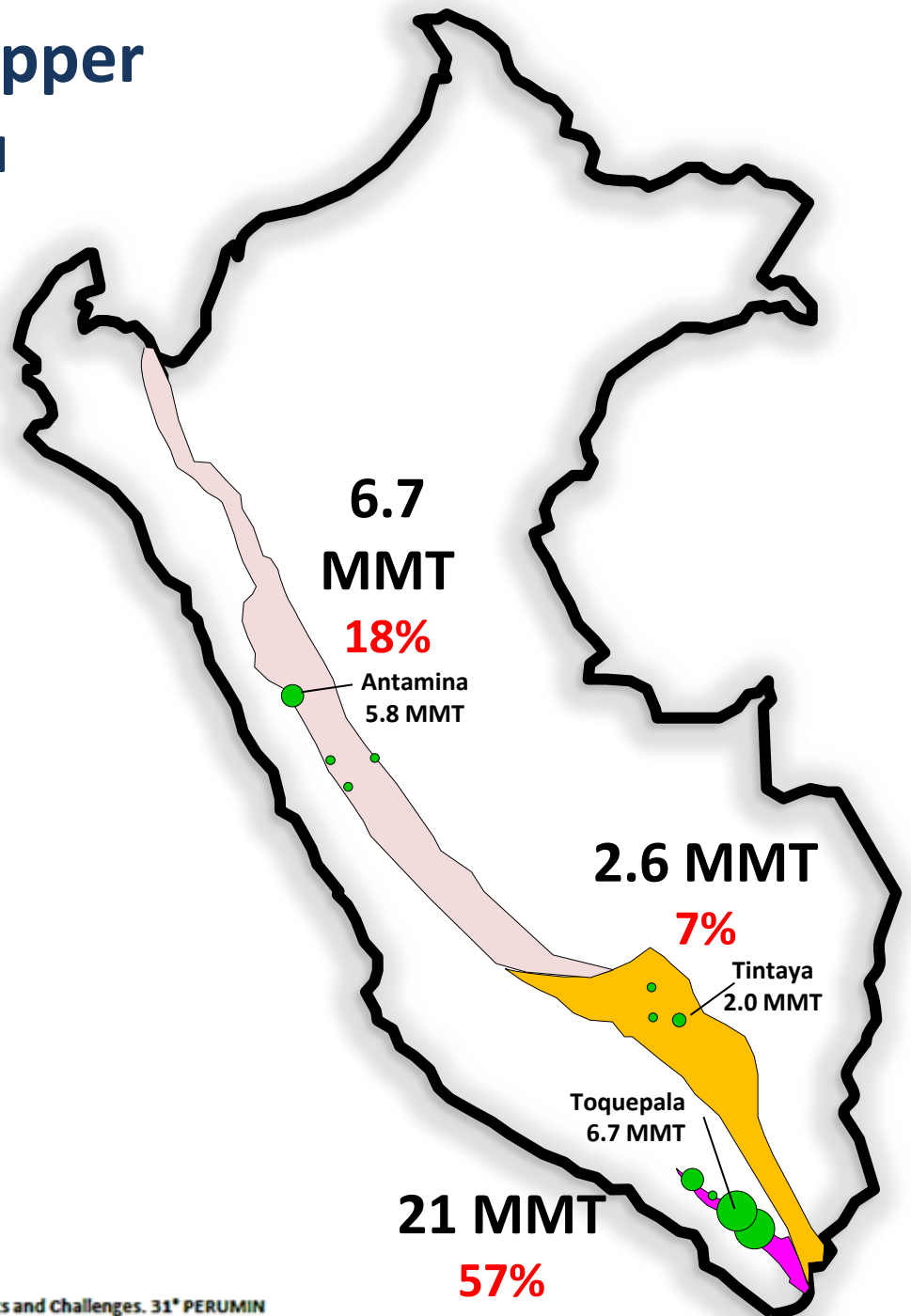
Miocene porphyry belt



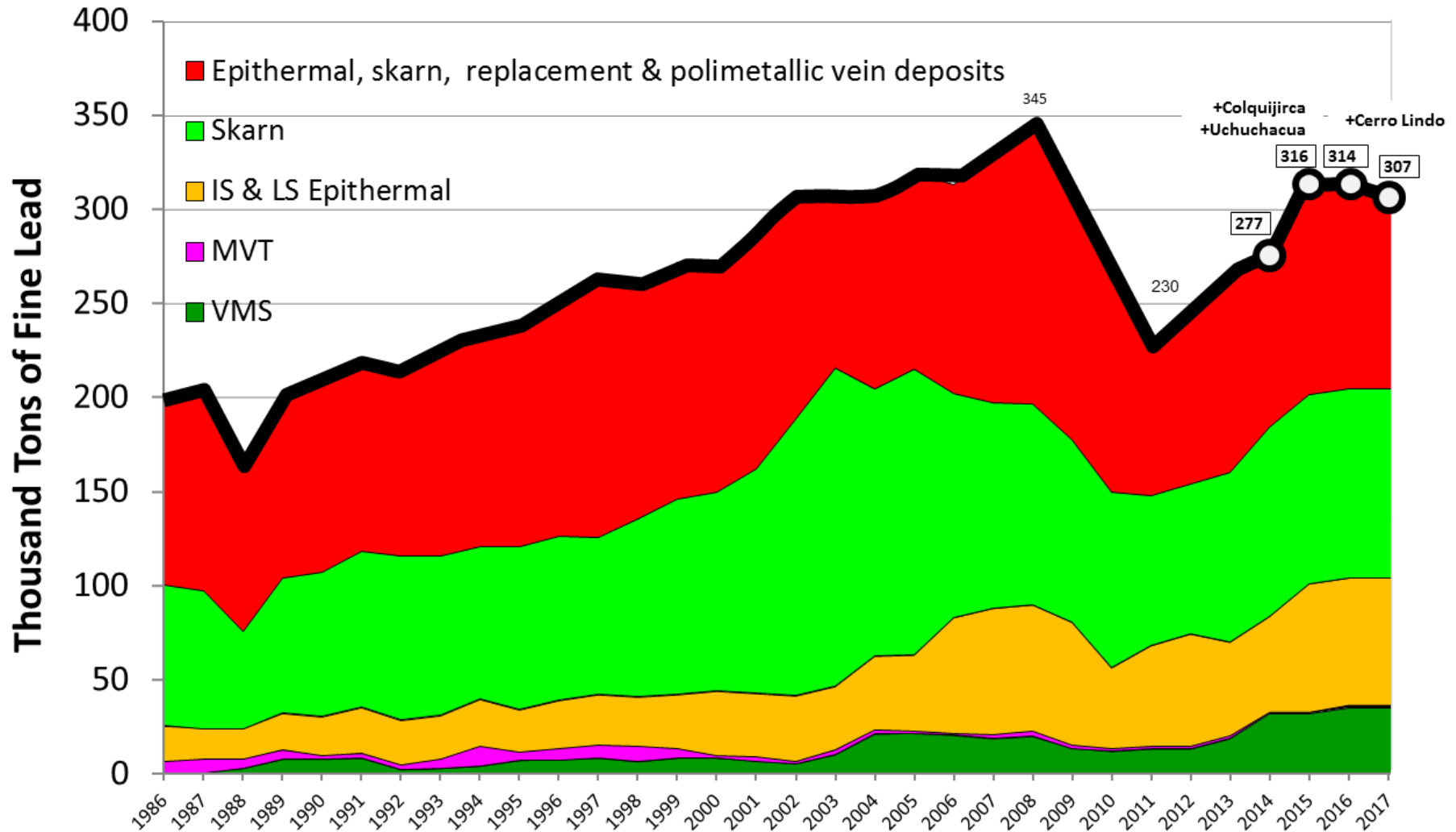
Eocene-oligocene porphyry belt



Paleocene porphyry belt



# Lead historical metallic production



# Historic Cumulative Lead Production in Peru

**Total Production in Peru  
~15 MMT (100%)**

From Miocene belt  
14.6 MMT (97%)

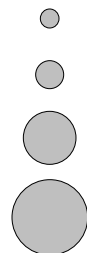
From Lower Cretacic-Paleocene belt  
0.3 MMT (2%)

Other no Pb-Zn belts  
0.1 MMT (1%)

**Production 2014  
Tons of Fine Lead  
X 1000**

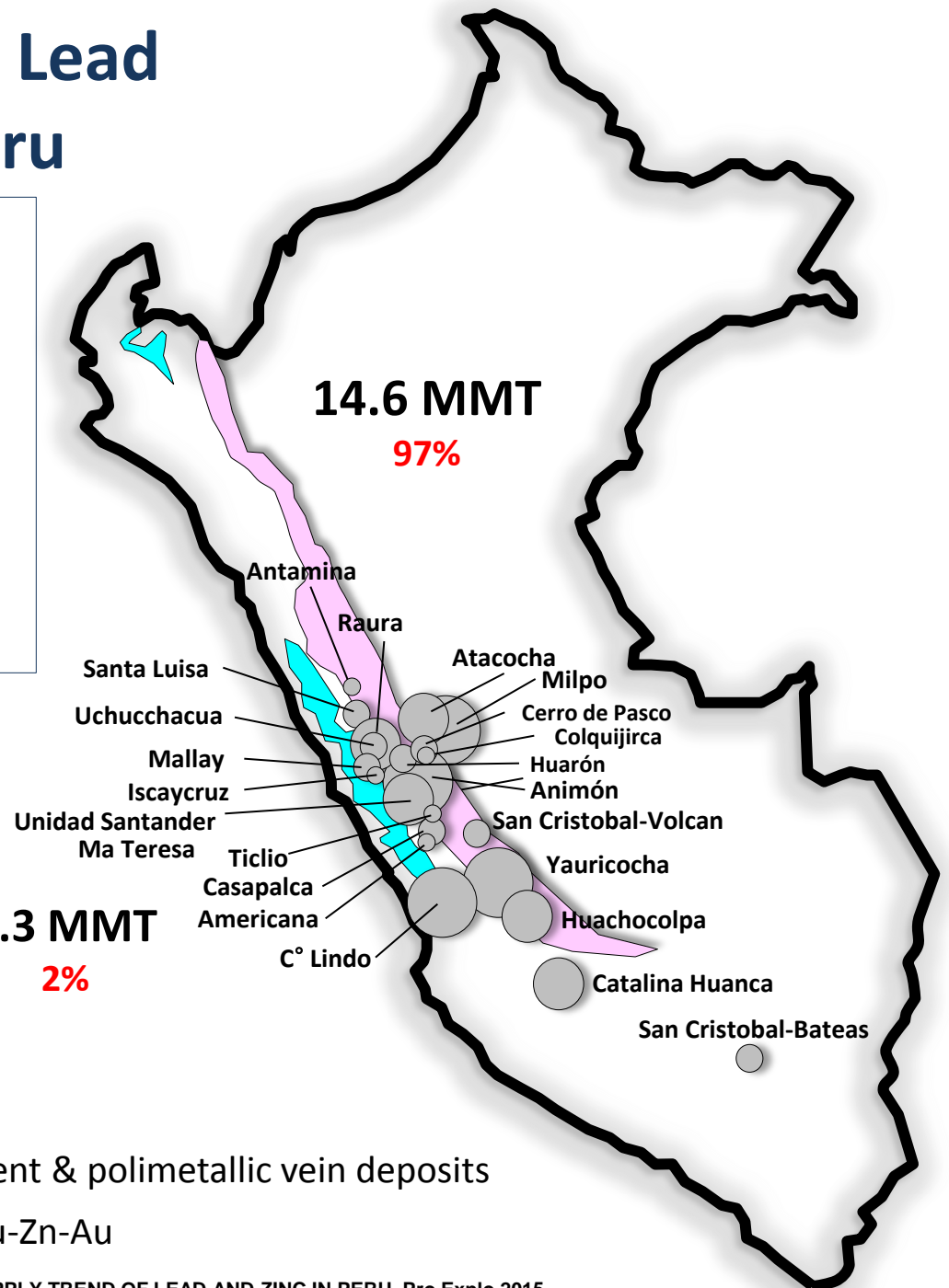
- < 7
- 7-10
- 10-15
- > 15

**Mines**



**0.3 MMT  
2%**

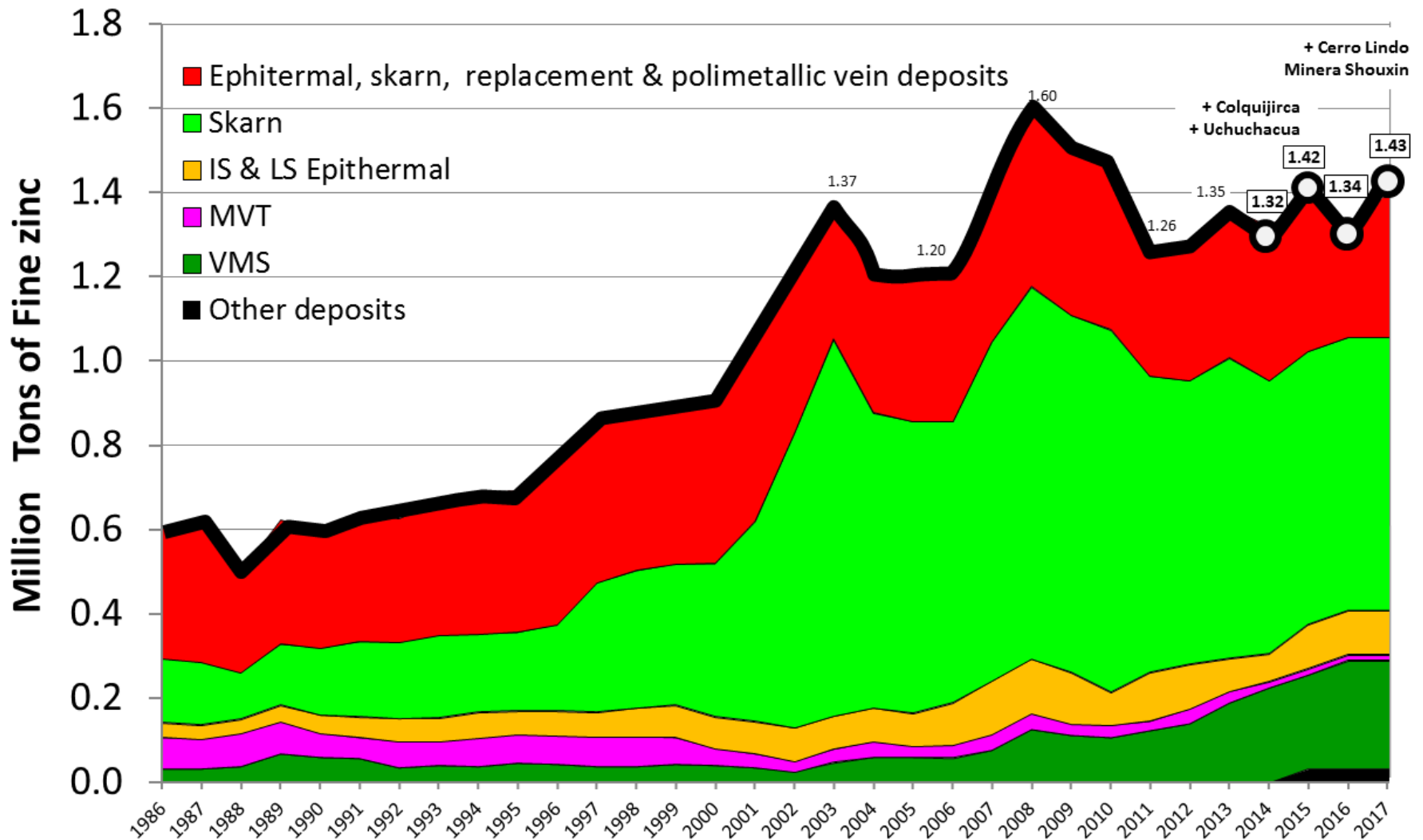
**14.6 MMT  
97%**



## Metallogenic belts

- Miocene epithermal, skarn, replacement & polymetallic vein deposits
- Lower Cretaceous– Paleocene VMS Cu-Zn-Au

# Zinc historical metallic production



# Historic Cumulative Zinc Production in Peru

Total Production in Peru  
**~45 MMT (100%)**

From Miocene belt  
 42.3 MMT (94%)

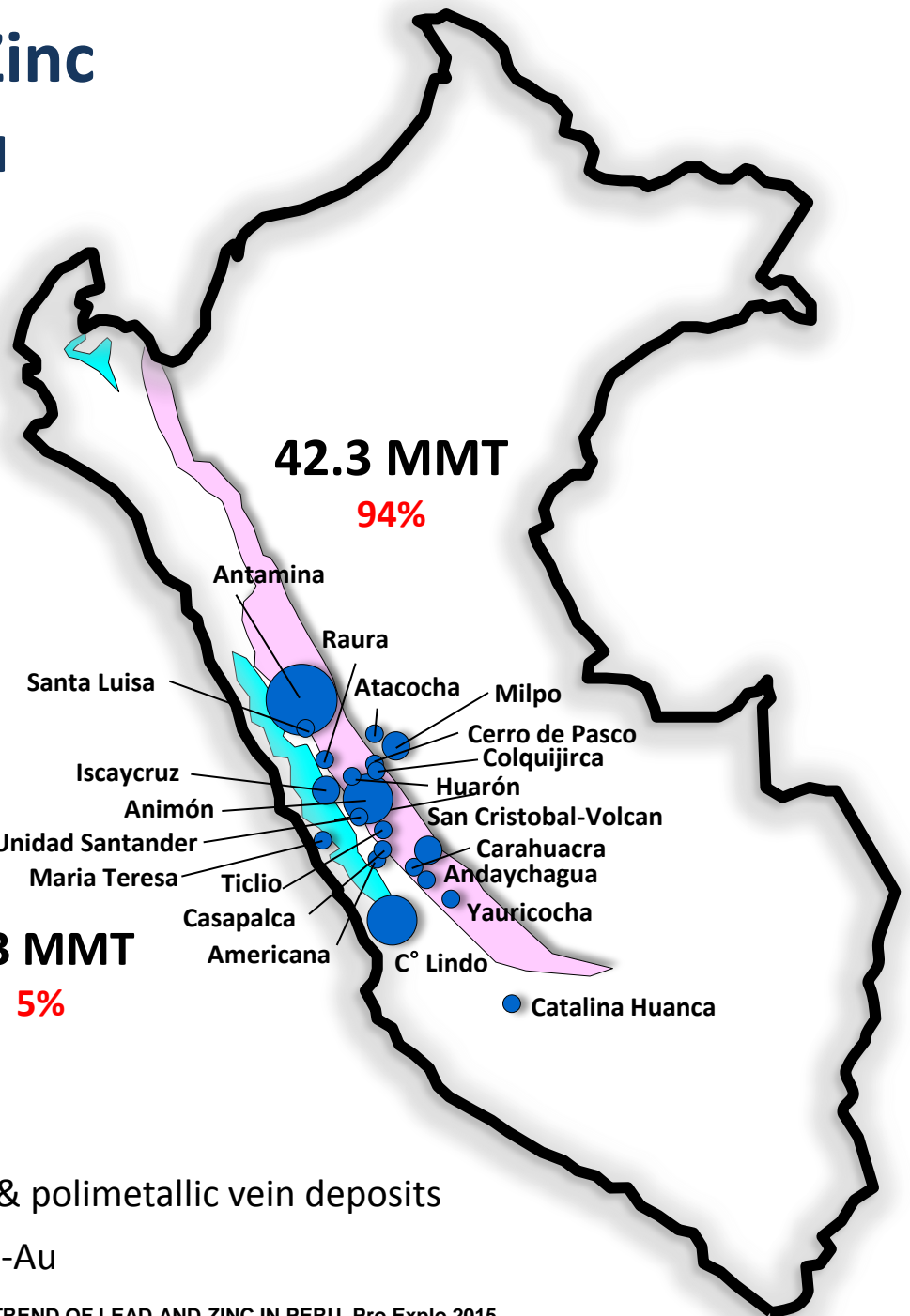
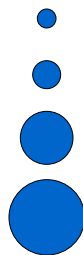
From Lower Cretaceous-Paleocene belt  
 2.3 MMT ( 5%)

Other no Pb-Zn belts  
 0.4 MMT ( 1%)

Production 2014  
 Tons of Fine Zinc  
 X 1000

< 50  
 50-100  
 100-200  
 > 200

Mines



## Metallogenic belts

Miocene epithermal, skarn, replacement & polymetallic vein deposits

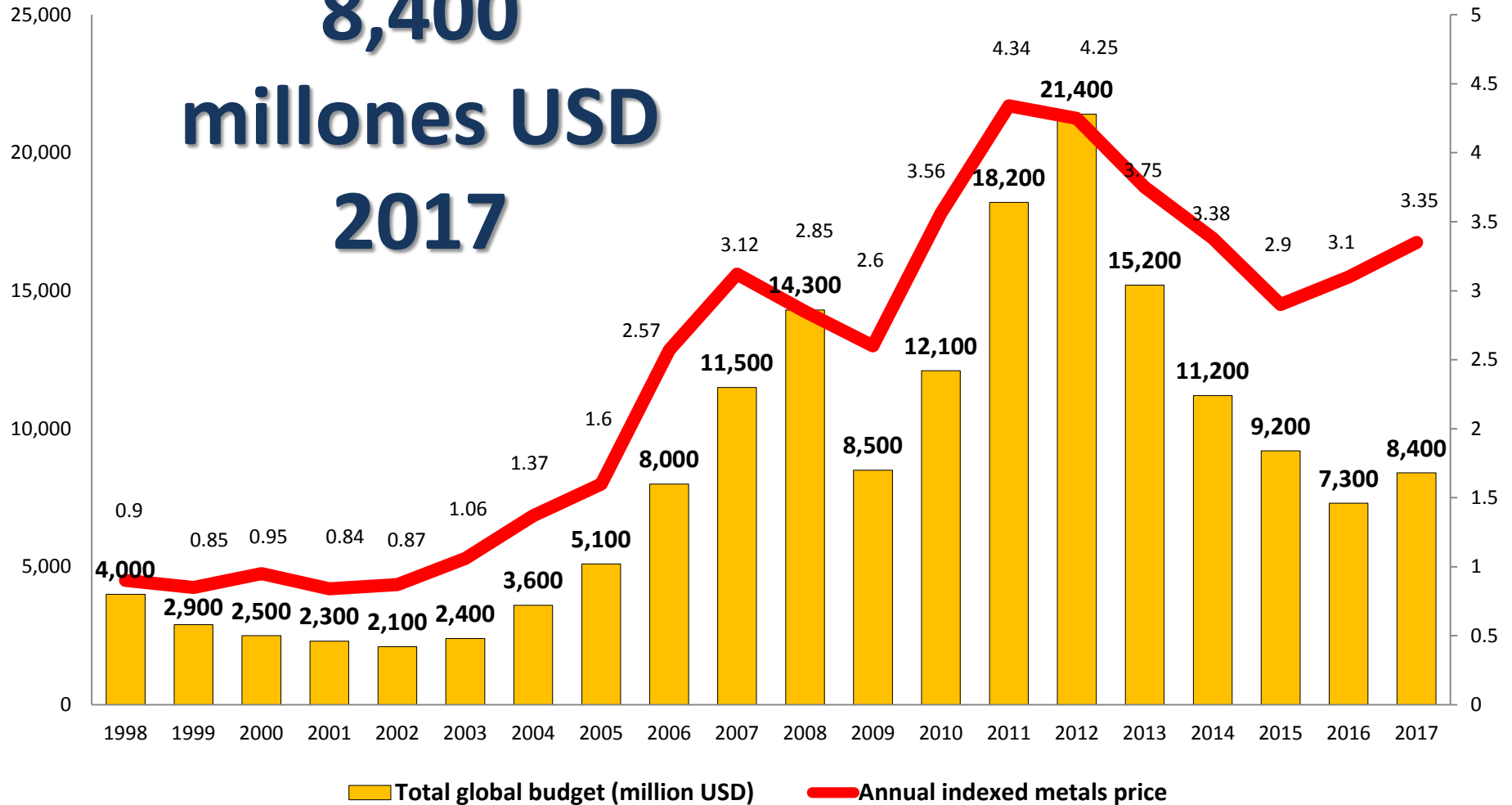
Lower Cretaceous– Paleocene VMS Cu-Zn-Au



# Ranking of Global Investment in Mining Exploración

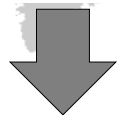
# Record of Global Exploration Budget

**8,400**  
**millones USD**  
**2017**



# 5<sup>th</sup> Place in Participation of the Global Budget in Mining Exploration (%)

**8,400  
millones USD**



**588 millones  
USD**

**Canadá 14**

**EE.UU. 8**

**México 6**

**4**

**Perú 7**

**3 Brasil**

**Chile 8 2 Argentina**

**Europa 5**

**África Oeste 6**

**África Este 2**

**África Central 2**

**Sudáfrica 2**

**FBU 2**

**Rusia 4**

**China 5**

**Pacific/SE Asia 4**

**Australia 14**

# Mining and Exploration Investment in Peru

# Peruvian Total Mining Investment (Million USD)

last 10 year acumulated  
mining investment

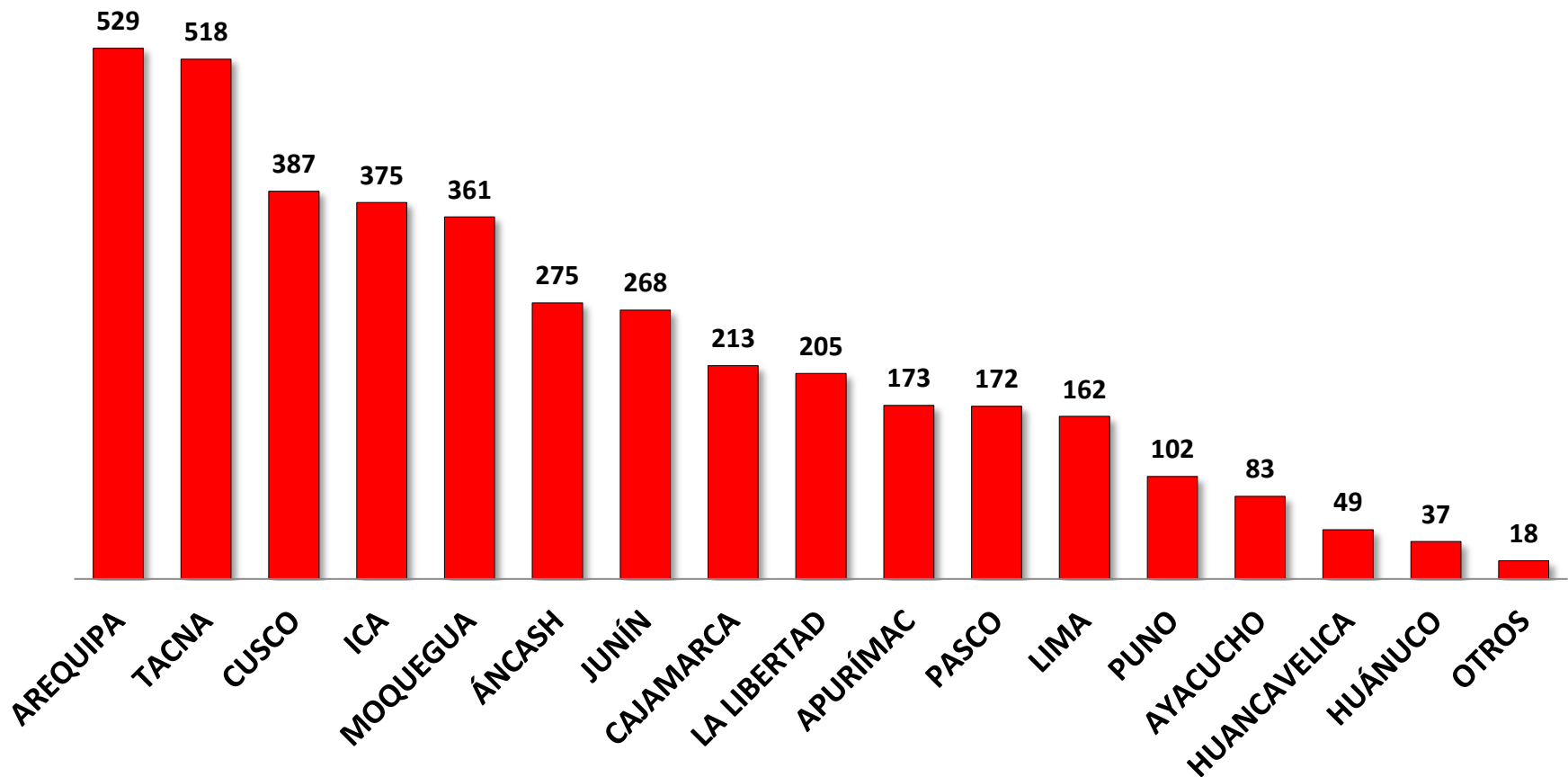
**51,790**  
millions USD



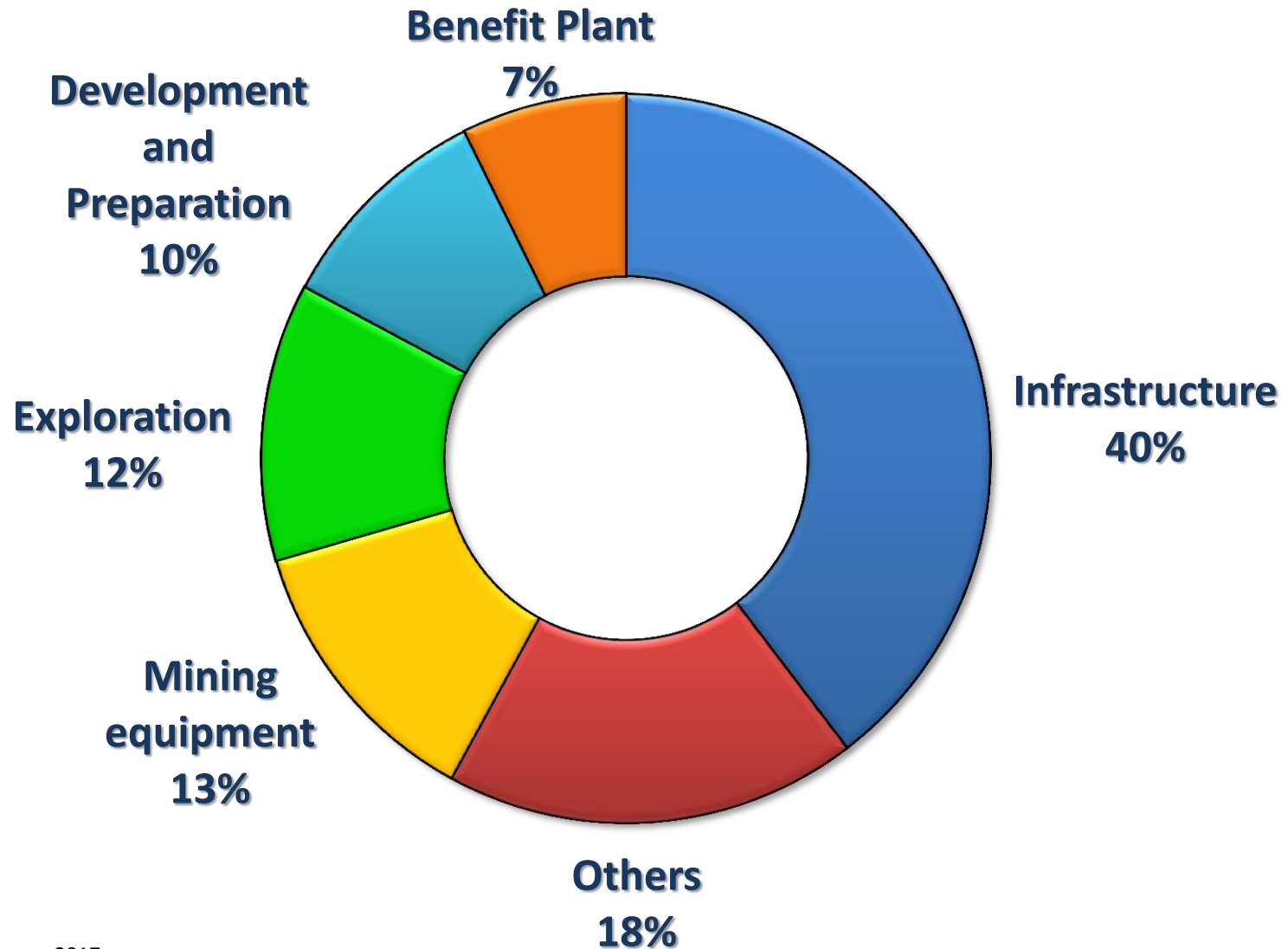
Source: Anuario minero 2017

\* Datos preliminares

# Annual Mining Investment by Region (Million USD) 2017



# Annual Investment in Mining by Rubros 2017



# Peruvian Total Exploration Investment (Million USD)

last 10 year acumulated  
exploration investment

**5,743 millions  
USD**

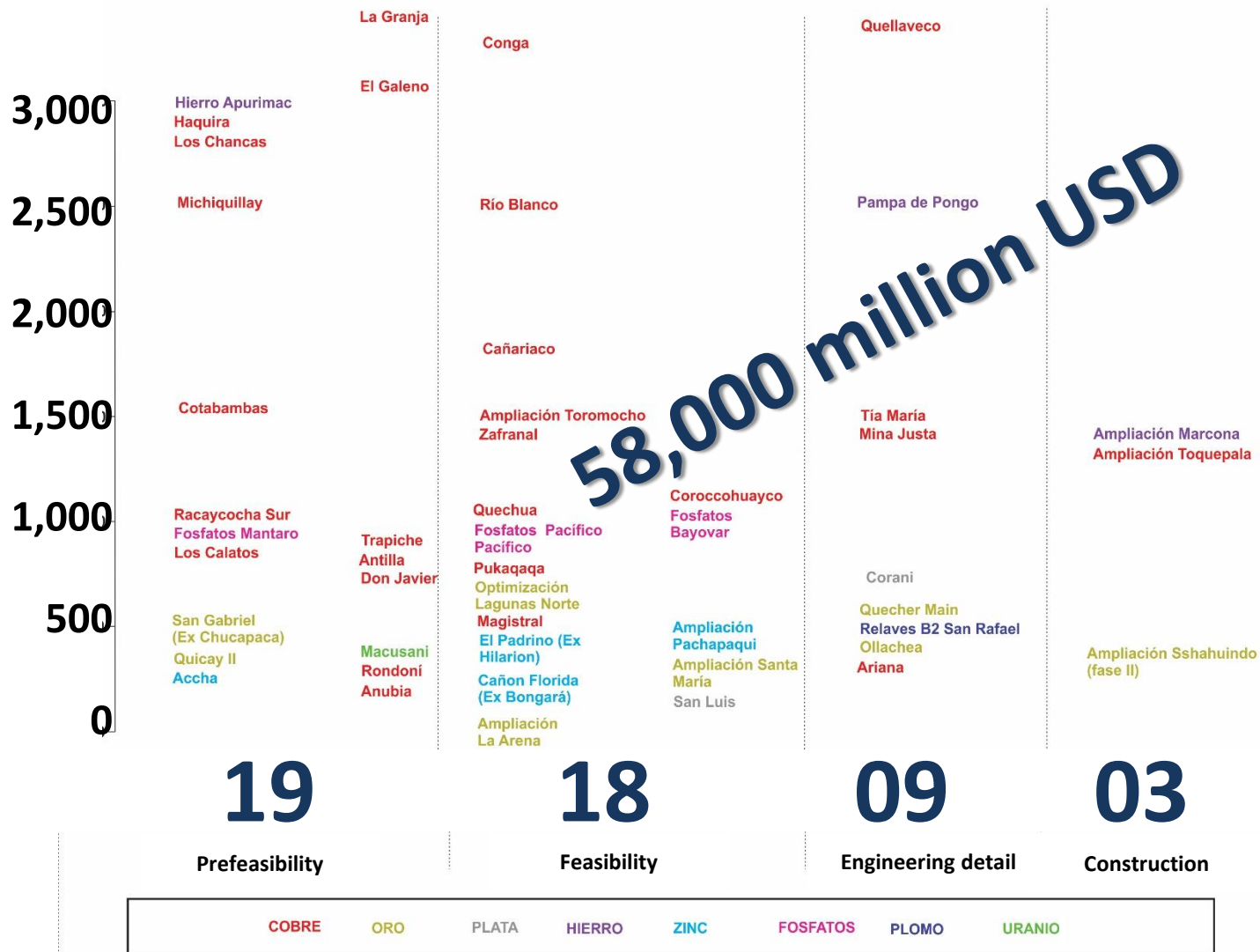


Source: Anuario minero 2017

\* Datos preliminares



# Portfolio of Mining Construction Projects According to Stage, Metal and Investment



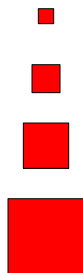
# Future Producers of Au-Ag-Cu-Pb-Zn en Peru

Planned Annual Production of

Tons of Fine Copper  
X 1000

1-10  
10-50  
50-200  
200-500

Projects

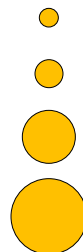


Planned Annual Production

Ounces of Fine Gold  
X 1000

< 100  
100-200  
400-200  
> 400

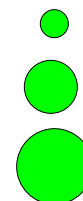
Projects



Annual Production  
Million Ounces of Fine Silver

< 2  
2-4  
> 4

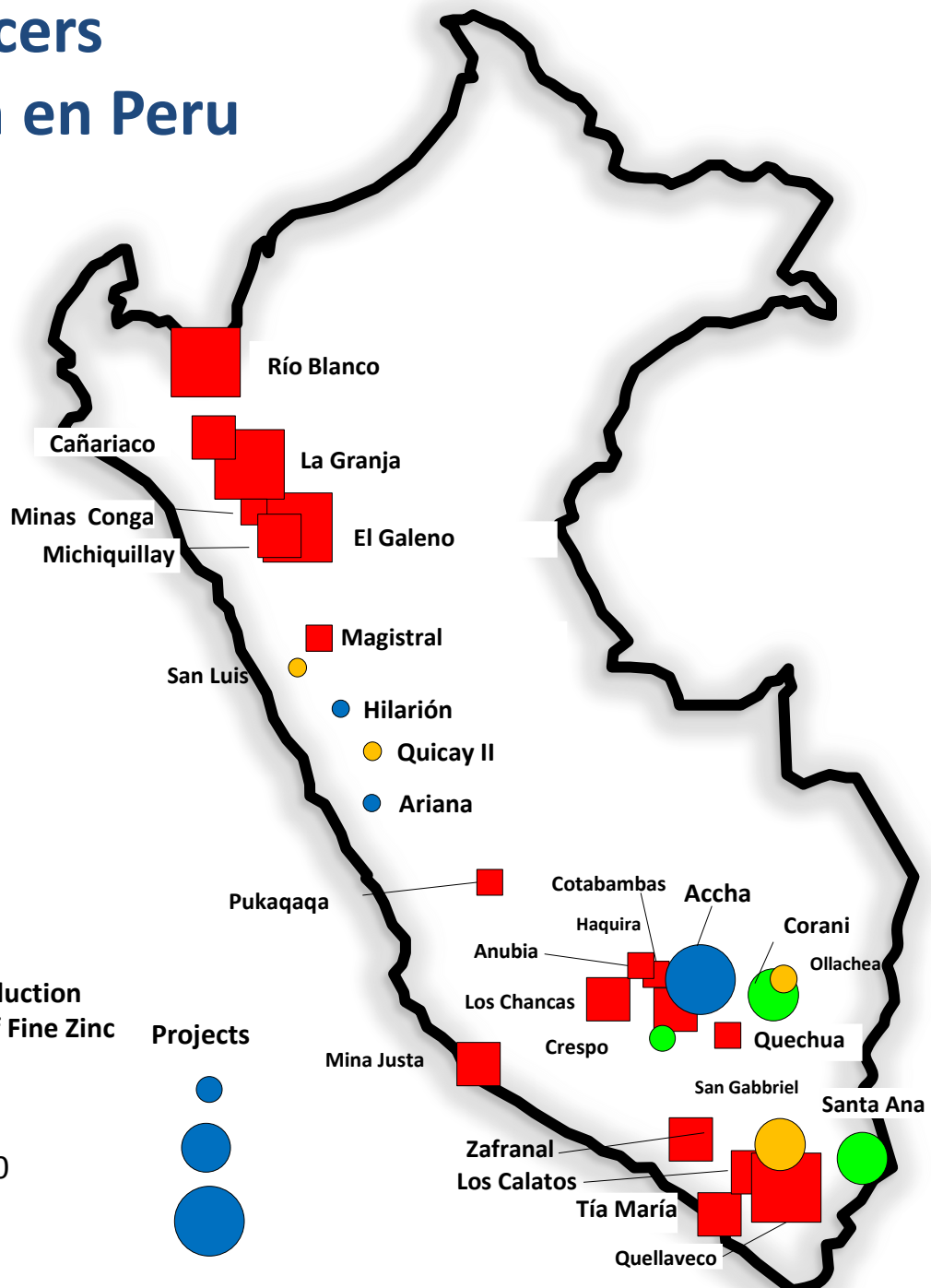
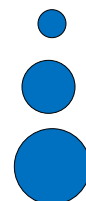
Projects



Annual Production  
Million Tons of Fine Zinc

< 50  
50-100  
> 100

Projects



# Gracias

# METALLIC MINING POTENTIAL AND ITS IMPACT ON MINING EXPLORATION IN PERU



**INGEMMET**  
DIRECCIÓN DE RECURSOS MINERALES Y  
ENERGÉTICOS

Lima  
Setiembre, 2018