



COCHILCO
Ministerio de Minería

Gobierno de Chile

CHILEAN COPPER MINING COSTS

Jorge Cantallop
Director of Research and Policy Planning
Chilean Copper Commission

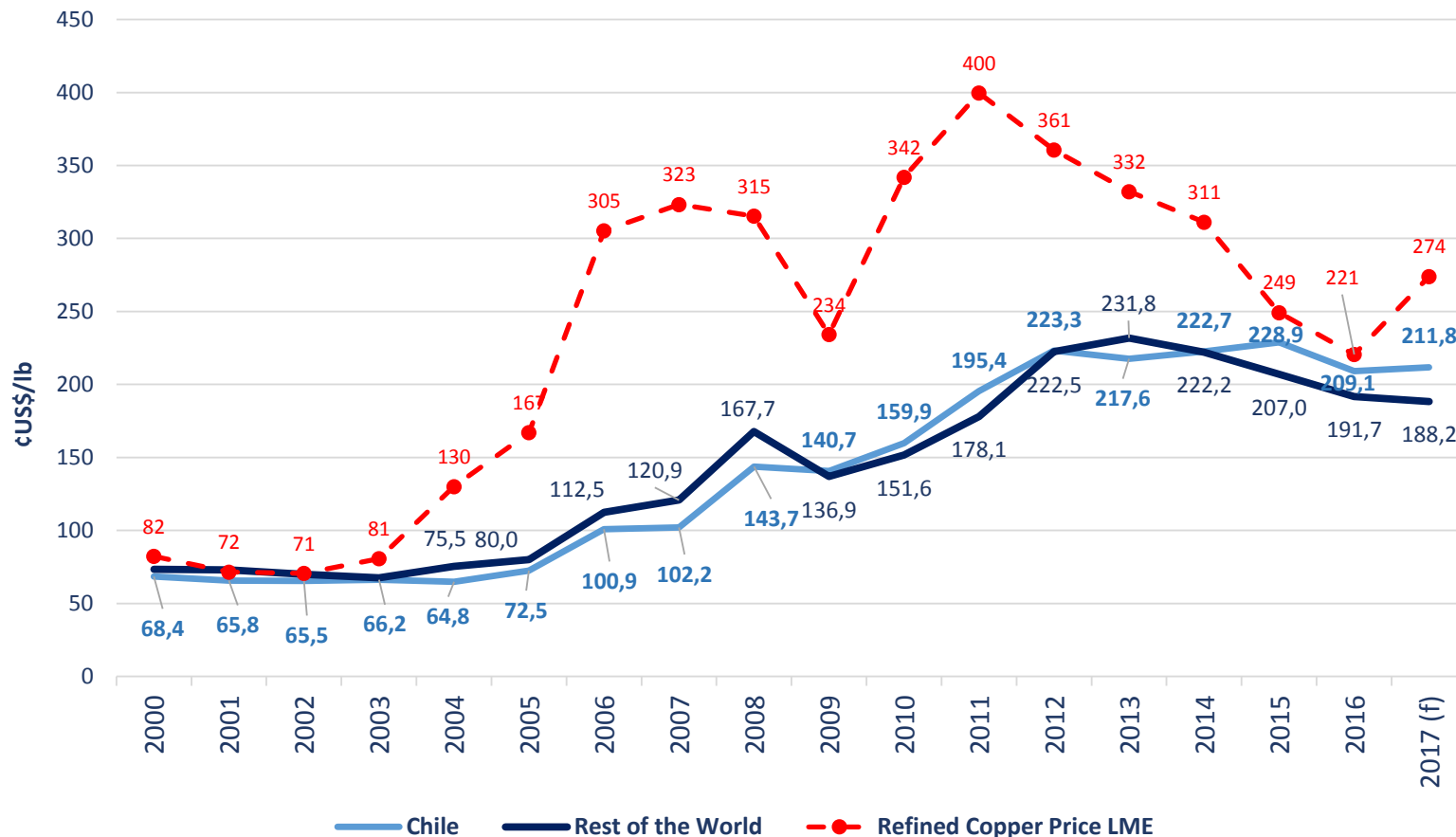
December, 2017



01 | MINING COST: CHILE VS WORLD

NET CASH COST C3 VS COPPER PRICE

(¢US\$/LB)

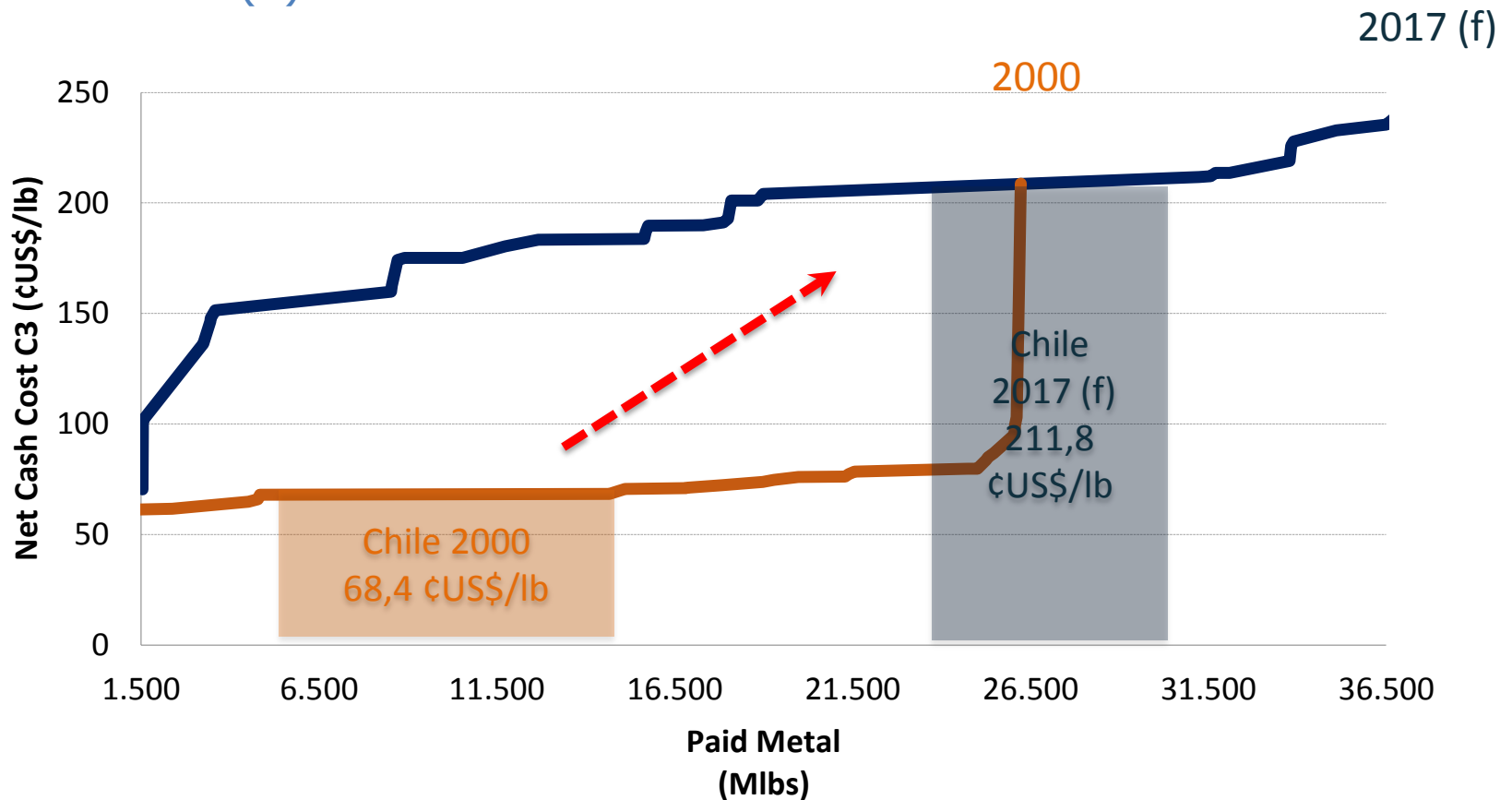


- **2012:** Mining companies began to make efforts to contain the rise in costs.
- **2016:** Margins of the companies presented levels observed before 2002.

Source: Cochilco and Woodmackenzie Q32017

WORLD COPPER NET CASH COST C3 CURVES

2000 VS 2017(F)

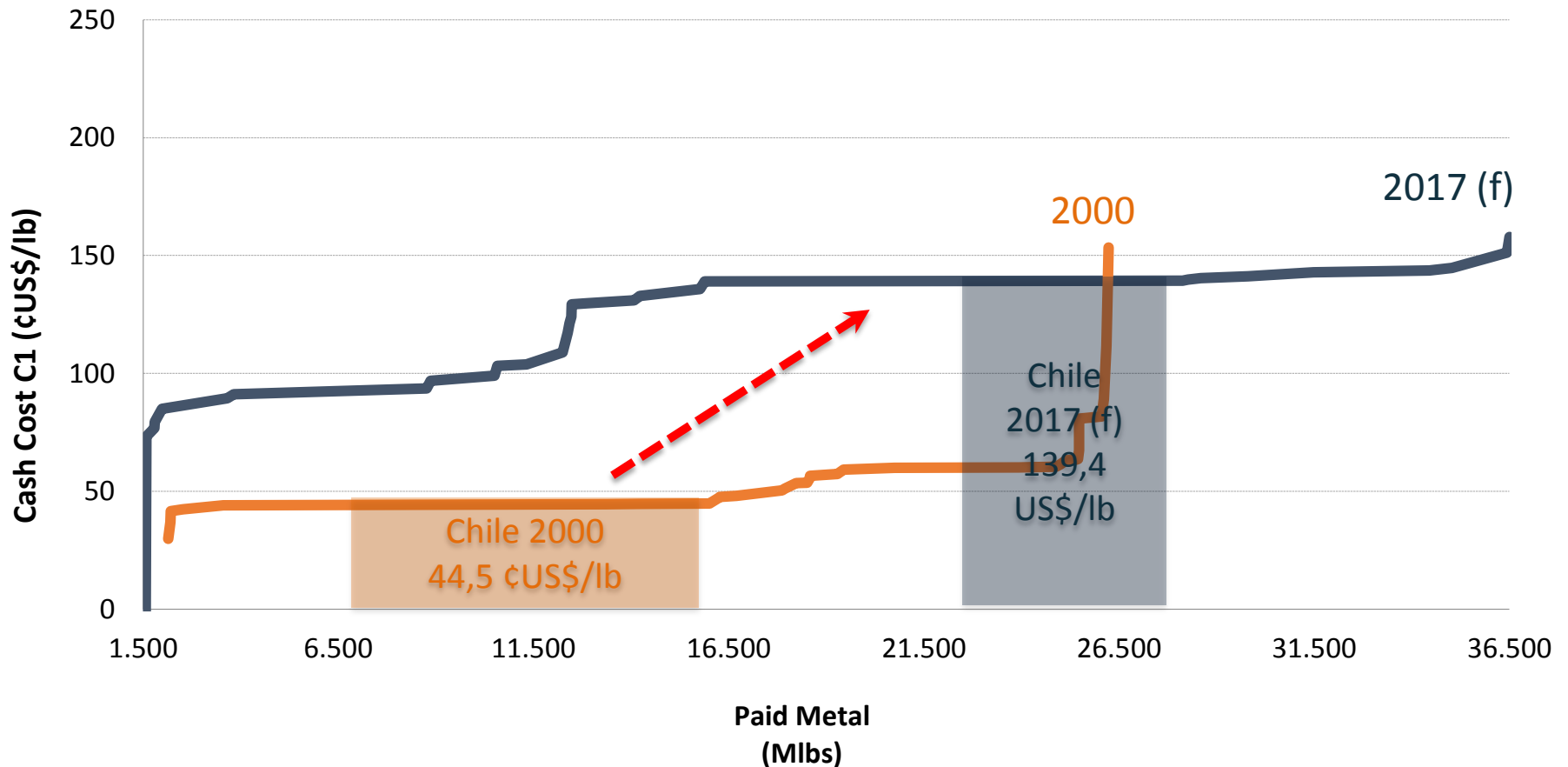


- Costs moved from the second to the fourth quartile.
- In 2000, the production of Chile represented 34.7% of the world copper mine production. In 2017 it represented 26.3% (august).


Source: Cochilco and Woodmackenzie Q32017

WORLD COPPER CASH COST C1 CURVES

2000 VS 2017(F)

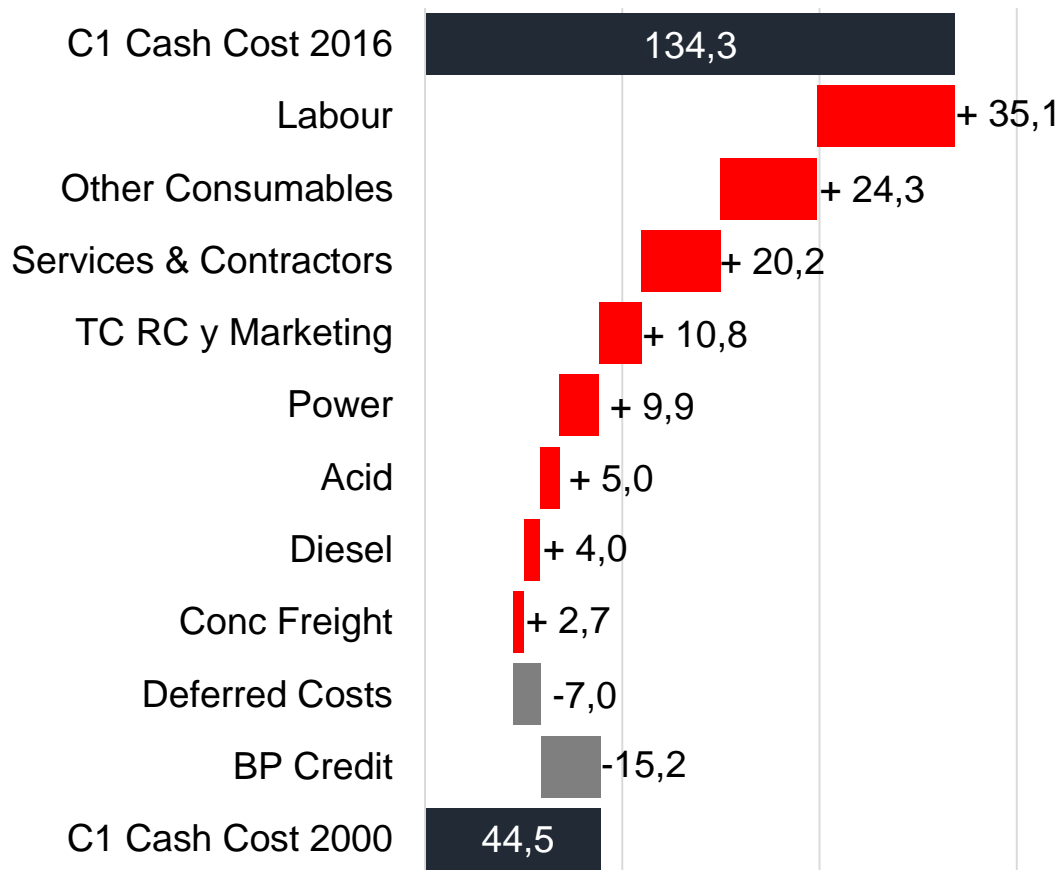


- Costs C1 moved from the second to the third quartile.

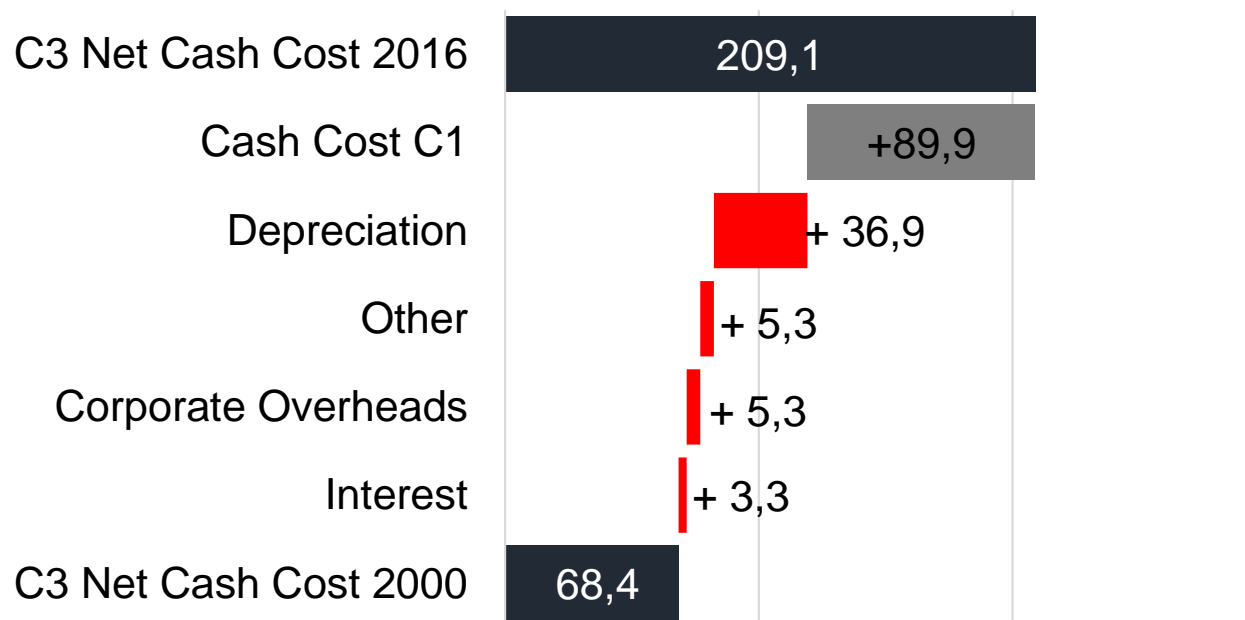


02 | COST OF LARGE MINING COMPANIES IN CHILE- KEY FACTORS

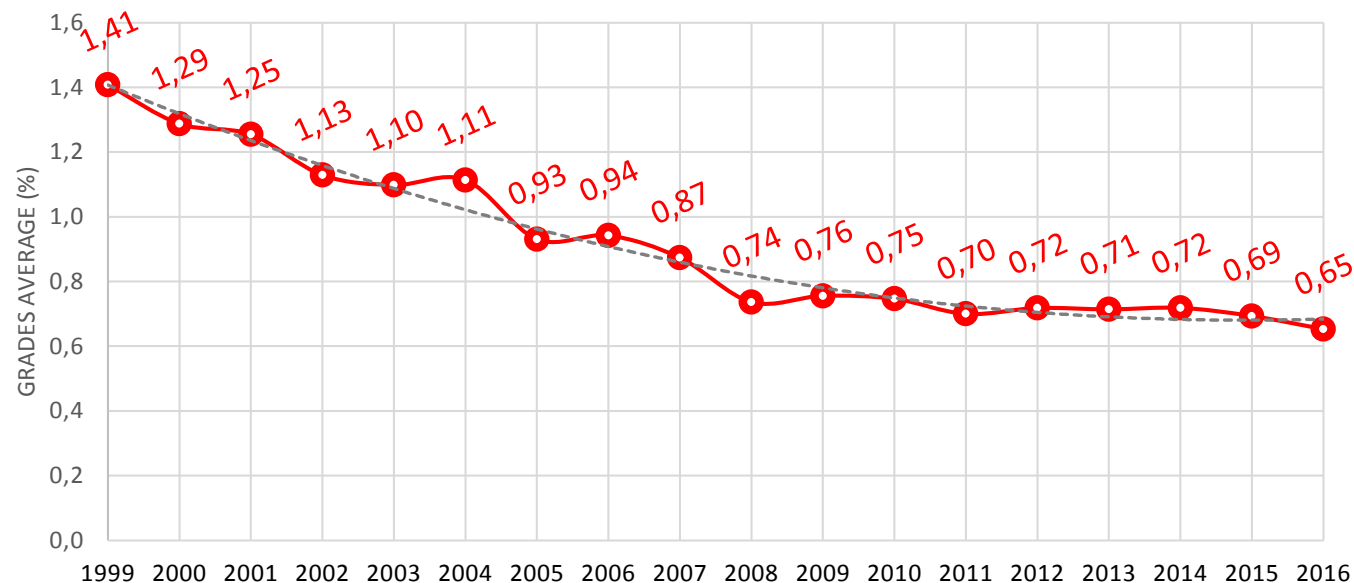
VARIATION PER ELEMENT CASH COST - CHILE 2000-2016 (¢US/LB)



VARIATION PER ELEMENT NET CASH COST - CHILE 2000-2016 (¢US/LB)



AVERAGE COPPER MINING GRADES IN CHILE 1999-2016

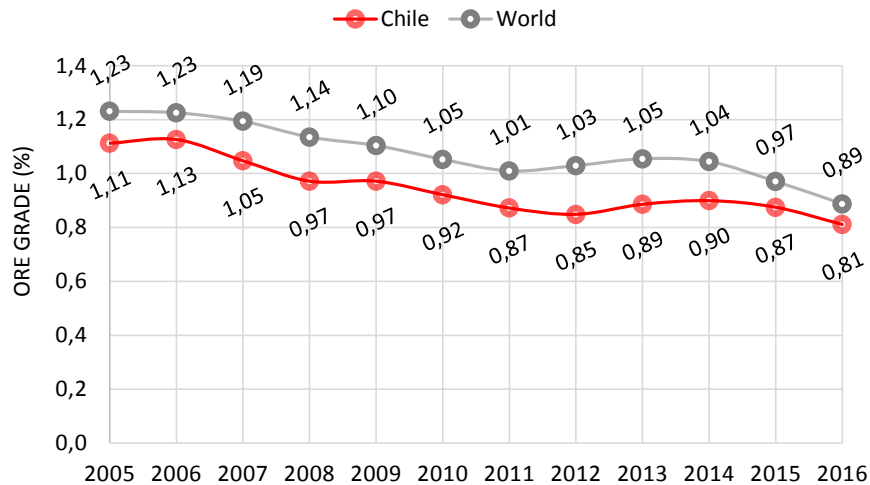


- The decrease in ore grade in Chile has been higher than the world average.
- Mining development in Chile began earlier and ore deposits and blocks with a higher concentration of ore have been exploited.

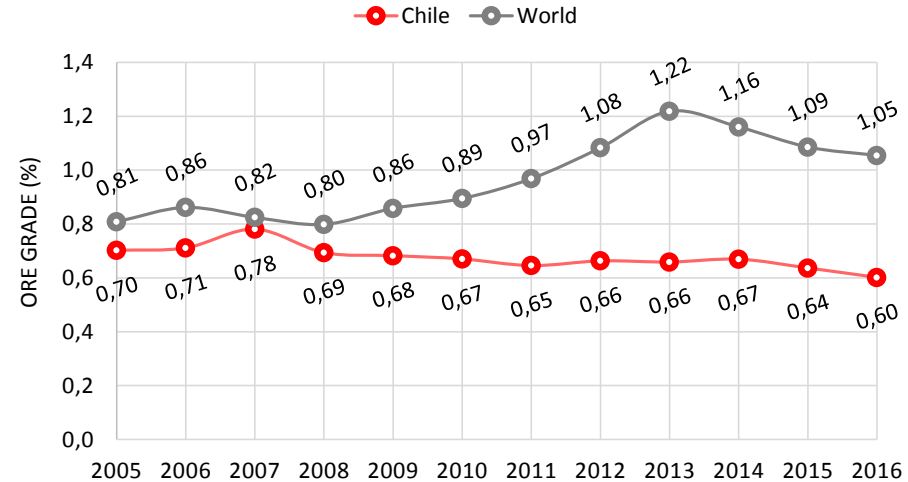
AVERAGE COPPER MINING GRADES

CHILE VS WORLD 2005-2016

Concentrator Plant



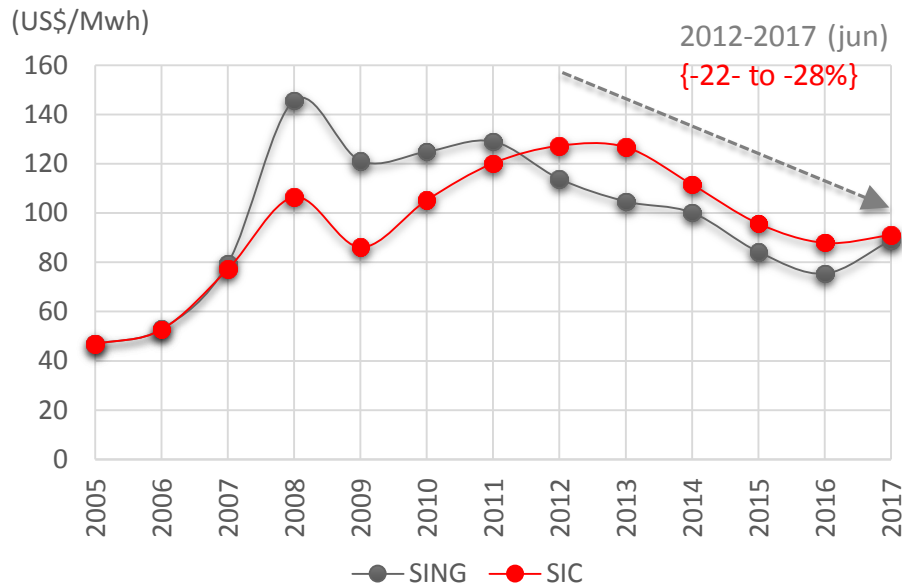
Heap Leach



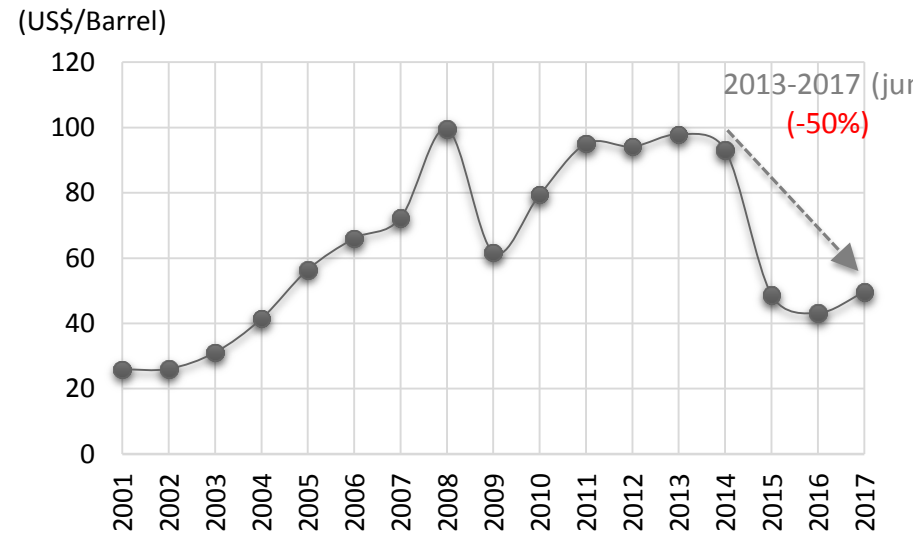
- Average Ore grades of the sulfide line have decreased similarly (27%), Chile and the World.
- Ore grades of the oxides line in Chile are lower than the world average.
- There is a depletion of oxidized resources in Chile, which will mean 66% lower production of SX-EW cathodes by 2027.

ENERGY AND DIESEL

Chilean Energy
PMM SING y SIC (*)



WTI Crude Oil



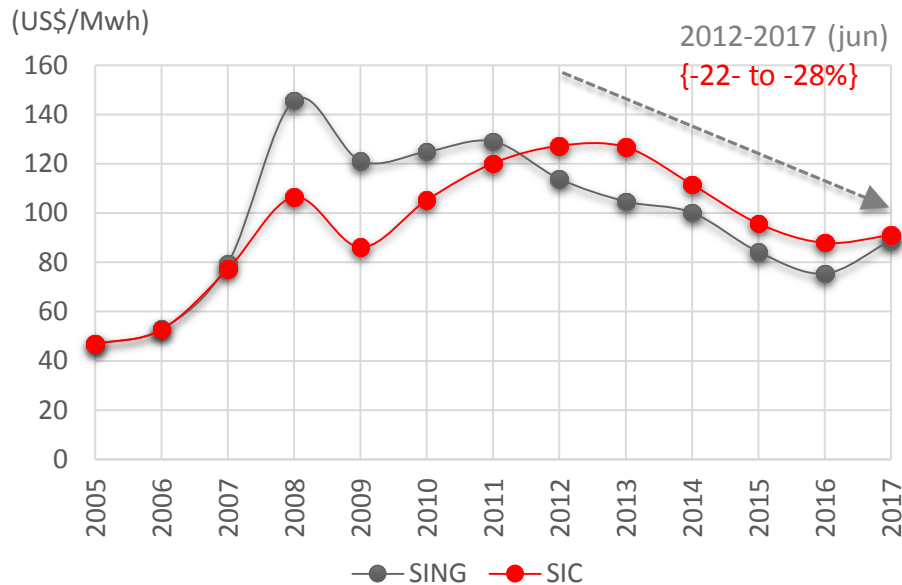
(*) Average Market Price of Customers not subject to price regulation

Lower generation cost due to the fall in the price of diesel, improvements in efficiency in existing processes and the incorporation of cheaper technologies (NCRE).

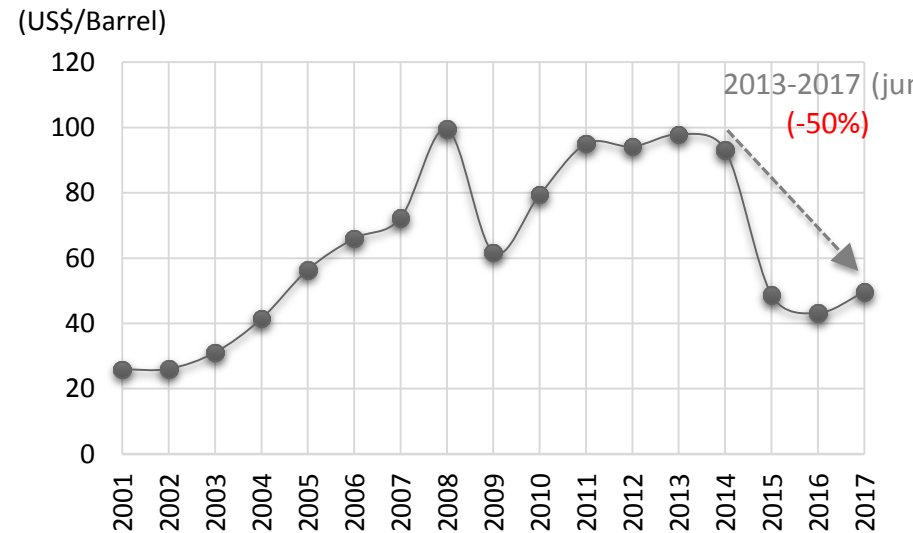
Growth of supply (new alternatives for extraction and others.) and lower demand (China and Europe), have caused the decrease in oil prices.

ENERGY AND DIESEL

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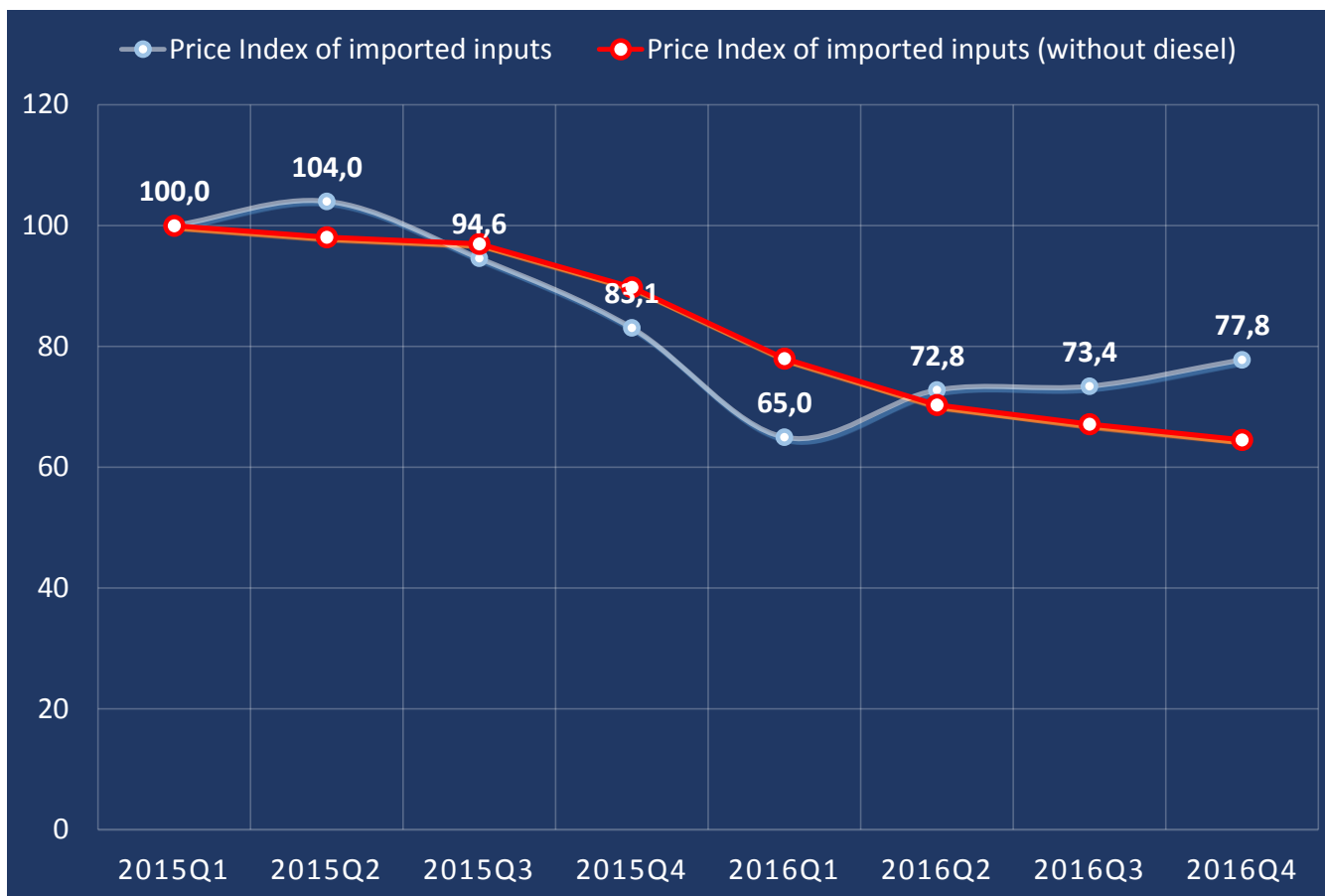
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PRICE VARIATION OF SOME IMPORTED MINING INPUTS

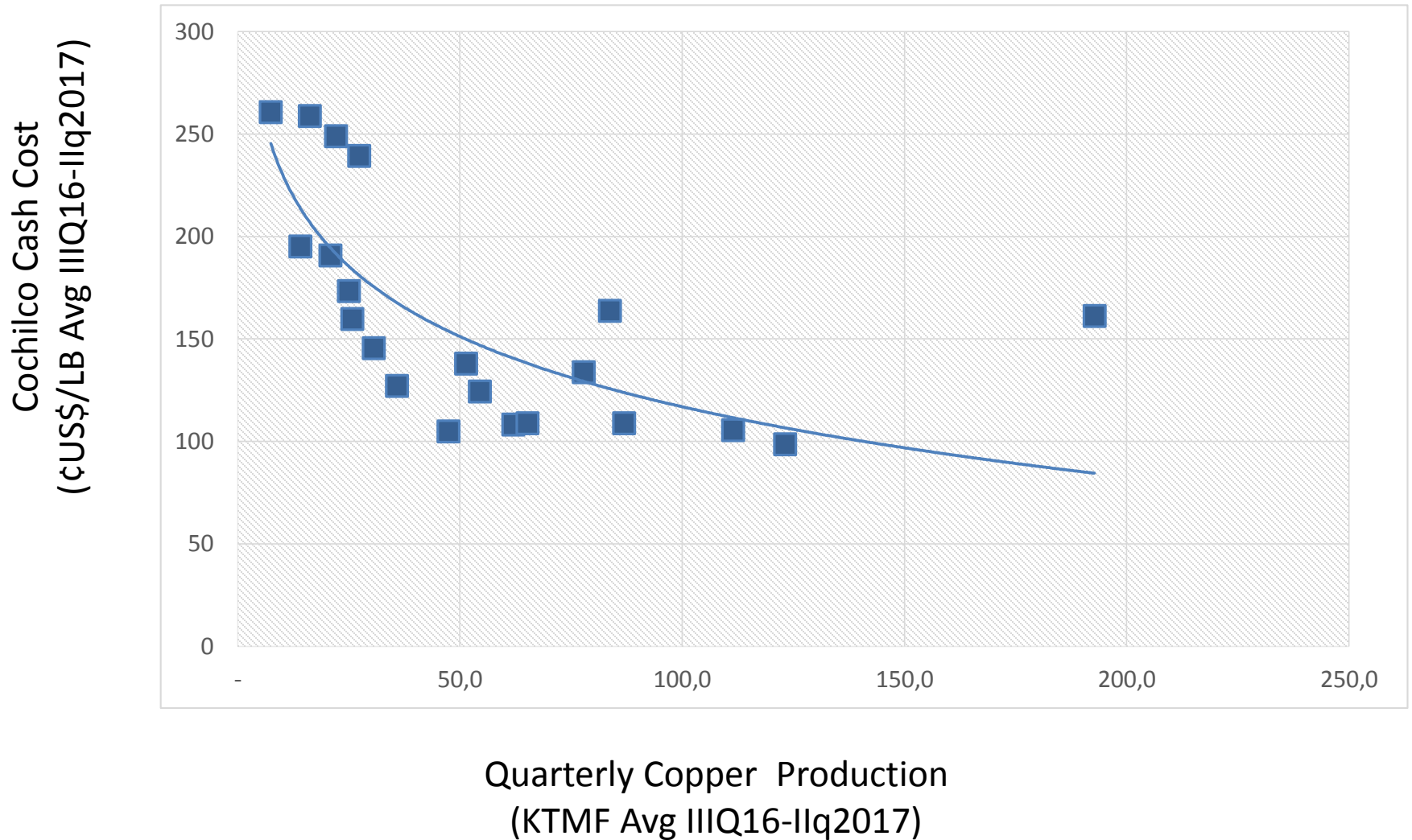
BASE 2005 = 100



The prices of mining inputs have declined in recent years, given the lower mining activity. Relevant inputs are: fuels, sulfuric acid, grinding balls, OTR tires, chemical reagents, lubricants, etc.

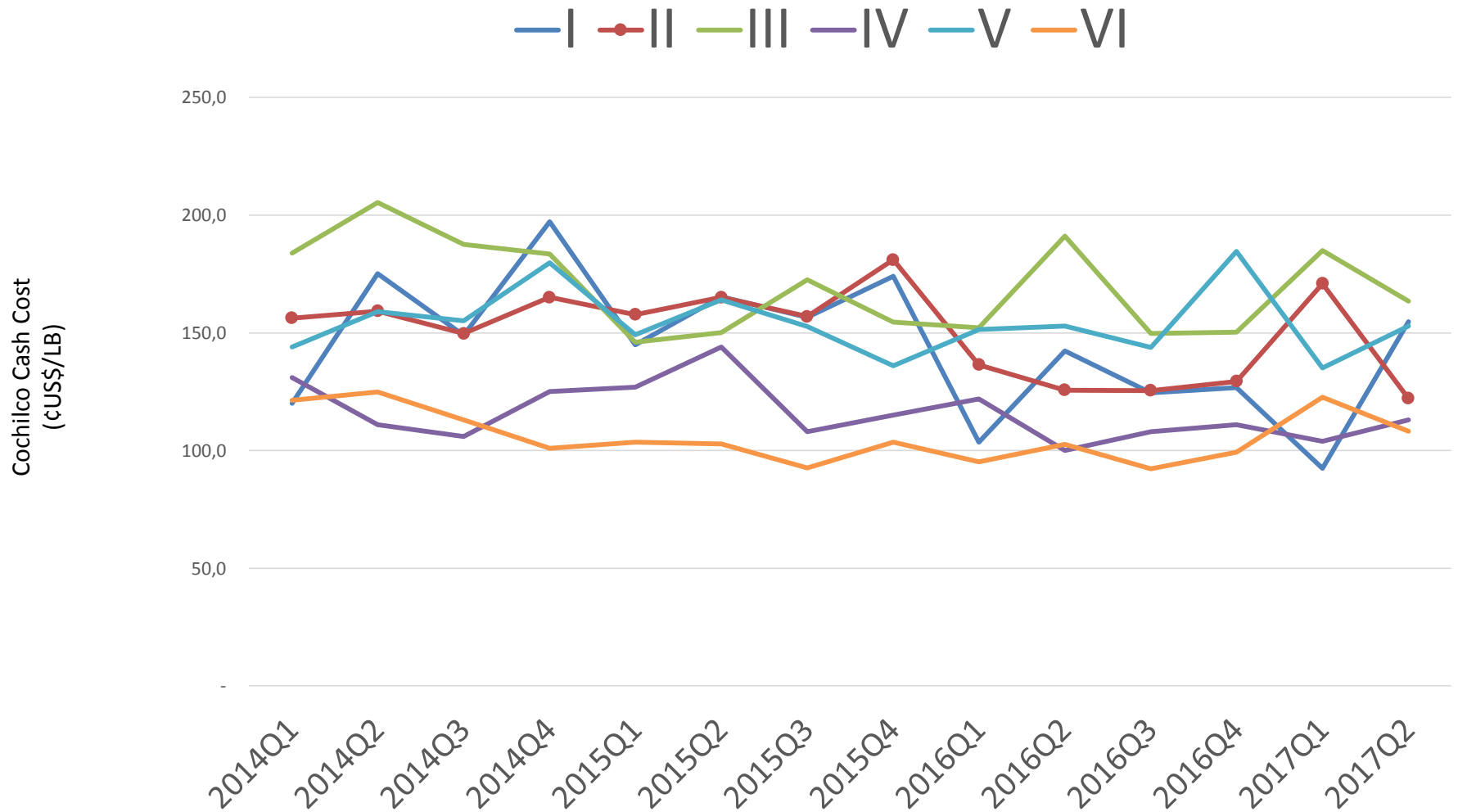
Source: Cochilco

SCALE IS RELEVANT BUT NOT DETERMINANT



Source: Cochilco

GEOGRAFICAL REGIONS ARE NOT DETERMINANT



Source: Cochilco



03 | CASH COST COCHILCO (¢US\$/lb) 2014 vs 2017 (accumulated up to June)



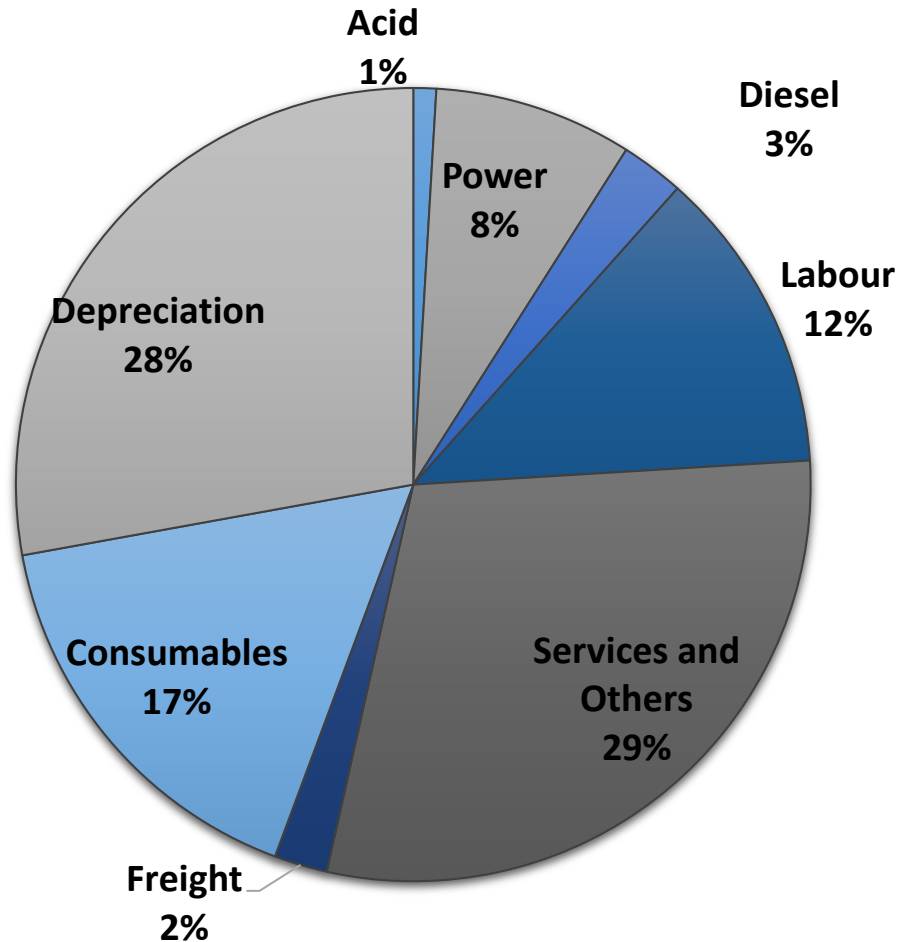
QUARTERLY MONITORING OF CHILEAN COSTS

- In 2014, Cochilco began to seek quarterly cash cost (C1) of the **21 largest copper producing operations** in Chile (“Observatorio de Costos”).
- They account **92%** of copper mine production in Chile and **25%** of world copper production.



OPERATIONAL COST OF LARGE CHILEAN COPPER MINING (%)

Q1 2017



- Services and purchase of consumables represent 46% of the operational costs.

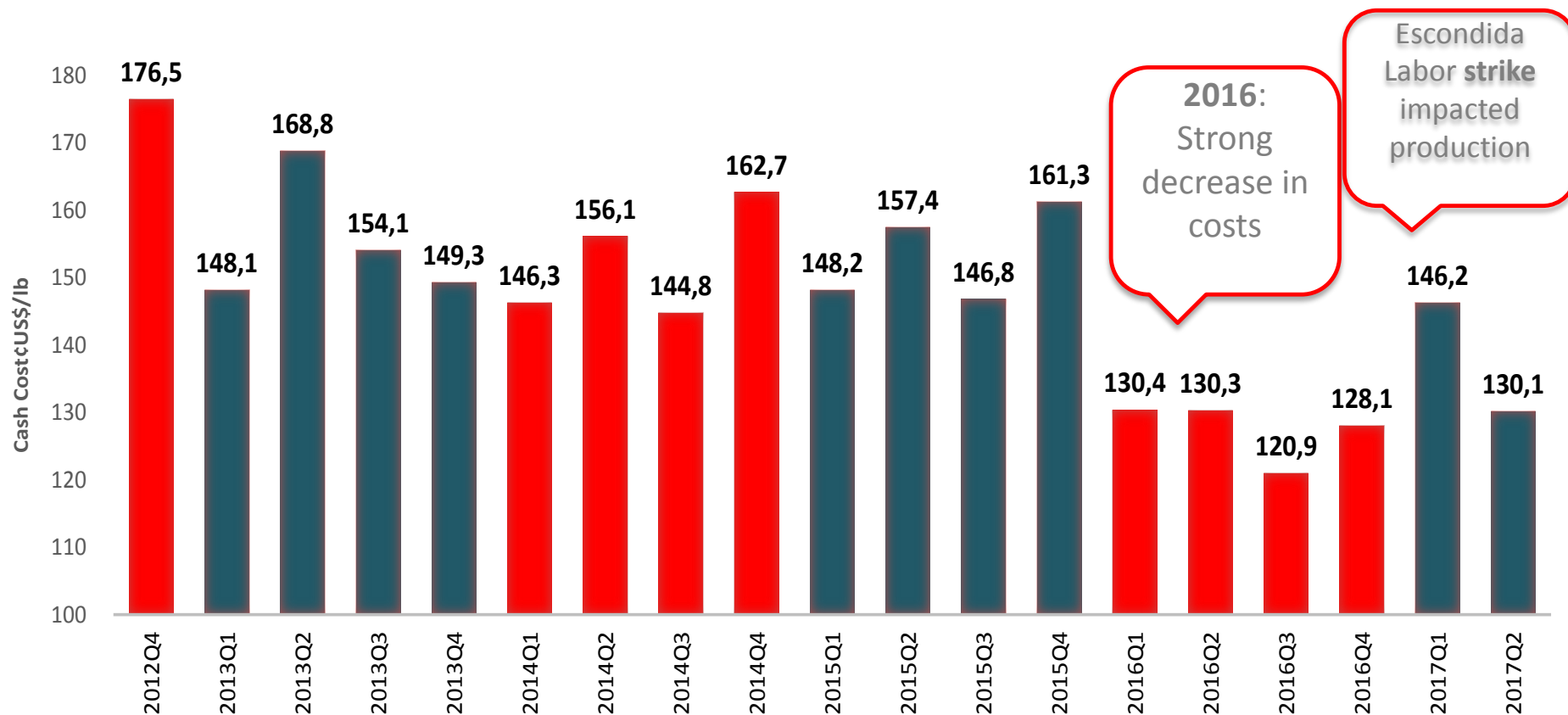
21 PRODUCERS - LARGE COPPER MINING

Operation	Main Controller	Accumulated production to June	
		(ktmf Cu)	%
Escondida	BHP Billiton	328	13,0%
El Teniente	Codelco	219	8,7%
Collahuasi	Anglo American plc y Glencore	247	9,8%
Anglo American Sur	Anglo American plc	175	6,9%
Los Pelambres	Antofagasta Minerals	170	6,8%
Radomiro Tomic	Codelco	152	6,0%
Chuquibambilla	Codelco	116	4,6%
Centinela	Antofagasta Minerals	117	4,6%
Andina	Codelco	112	4,4%
Spence	BHP Billiton	103	4,1%
Ministro Hales	Codelco	113	4,5%
Candelaria	LundinMining	76	3,0%
Gaby	Codelco	60	2,4%
Zaldivar	Barrick Gold/ Antofagasta Minerals	52	2,1%
Sierra Gorda	KGHM International Ltd	52	2,0%
Mantos Copper	Audley Capital Advisors LLP	42	1,7%
Caserones	SCM Minera Lumina Copper Chile	56	2,2%
Cerro Colorado	BHP Billiton	35	1,4%
El Abra	Freeport McM	37	1,5%
Salvador	Codelco	27	1,1%
Quebrada Blanca	Teck	12	0,5%
Otros		223	8,8%
Total país		2.522	100%
Representativeness			91,2%

Source: "Observatorio de Costos" Cochilco

QUARTERLY CHILEAN CASH COST (C1) Q4 2012- Q2 2017

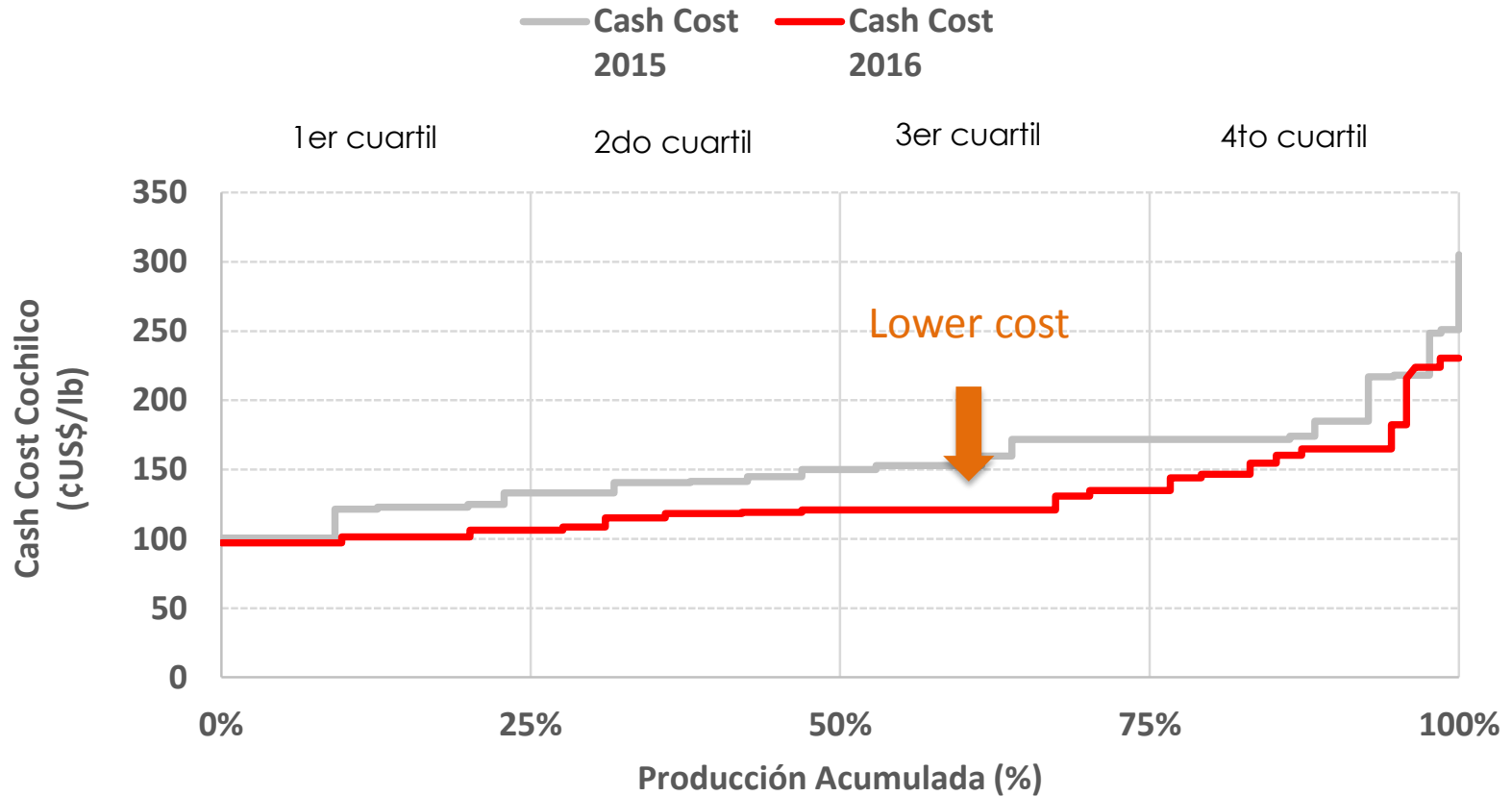
LARGE COPPER MINING



Source: "Observatorio de Costos" Cochilco

CASH COST (C1) LARGE COPPER MINING

2015 VS 2016



Source: "Observatorio de Costos" Cochilco

CASH COST COCHILCO (¢US\$/LB)

2015 VS 2016 (Accumulated Costs)


Cash Cost 2015 (¢US\$/lb)	153,5
Management efforts	-26,5
Market factors	-7,0
Lower Ore Grades	+7,3
Cash Cost 2016 (¢US\$/lb)	127,4

- Strong incidence of lower costs of Services.
- During 2016, a large part of the mining companies finalized their adjustment processes.
- Throughout 2016, costs were favored by a higher value of the average exchange rate and lower energy / fuel prices.
- High impact of lower ore grades, which in some cases was compensated with increased tonnage processed.

CASH COST COCHILCO (¢US\$/LB)

2016 vs 2017 (accumulated up to June)

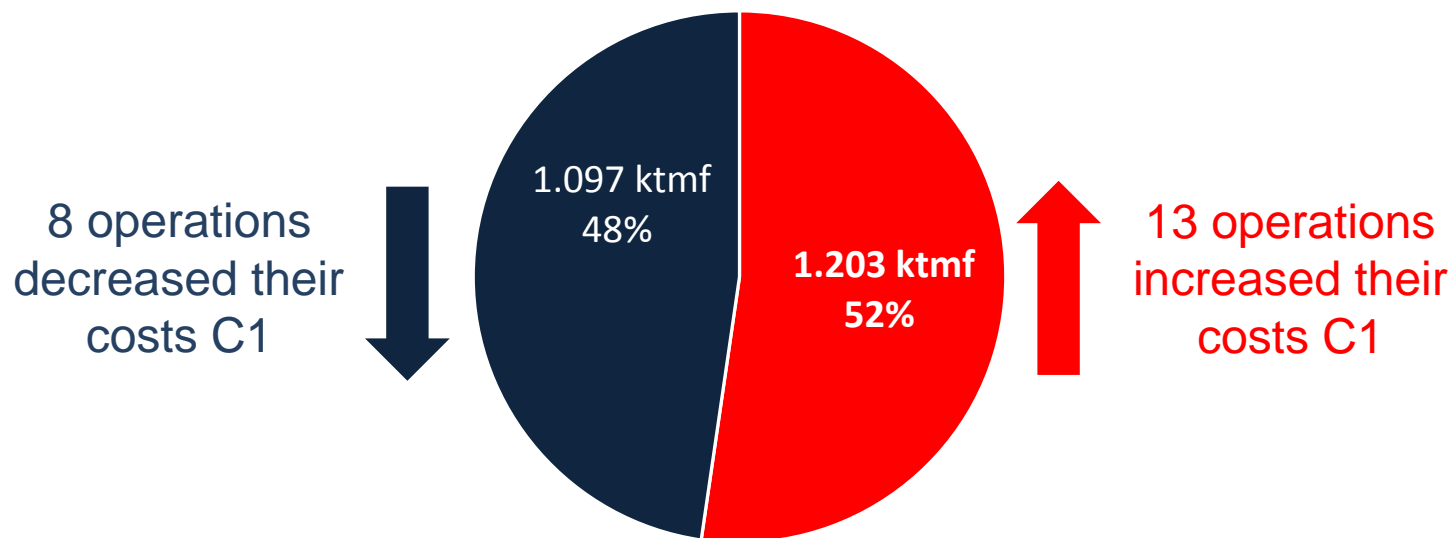
Cash Cost 2016 (¢US\$/lb)	129,7
Management Efforts	-1,6
Market Factors	-4,0
Lower Production	+13,7
Cash Cost 2017 (¢US\$/lb)	137,8

 + 8,0 ¢US\$/lb

- The lower copper production impacts on lower purchases of materials and consumption of Energy and Fuels.
- Higher prices of byproducts (subtracted from cost) and lower prices of materials and services (among others), help to counteract the strong impact of the lower price of the dollar.
- In the first semester, the impact of the fall of 10% in the production of the sample of 21 operations (- 252 ktmf) is maintained.

CASH COST COCHILCO (C1)

2016 vs 2017 (accumulated up to June)

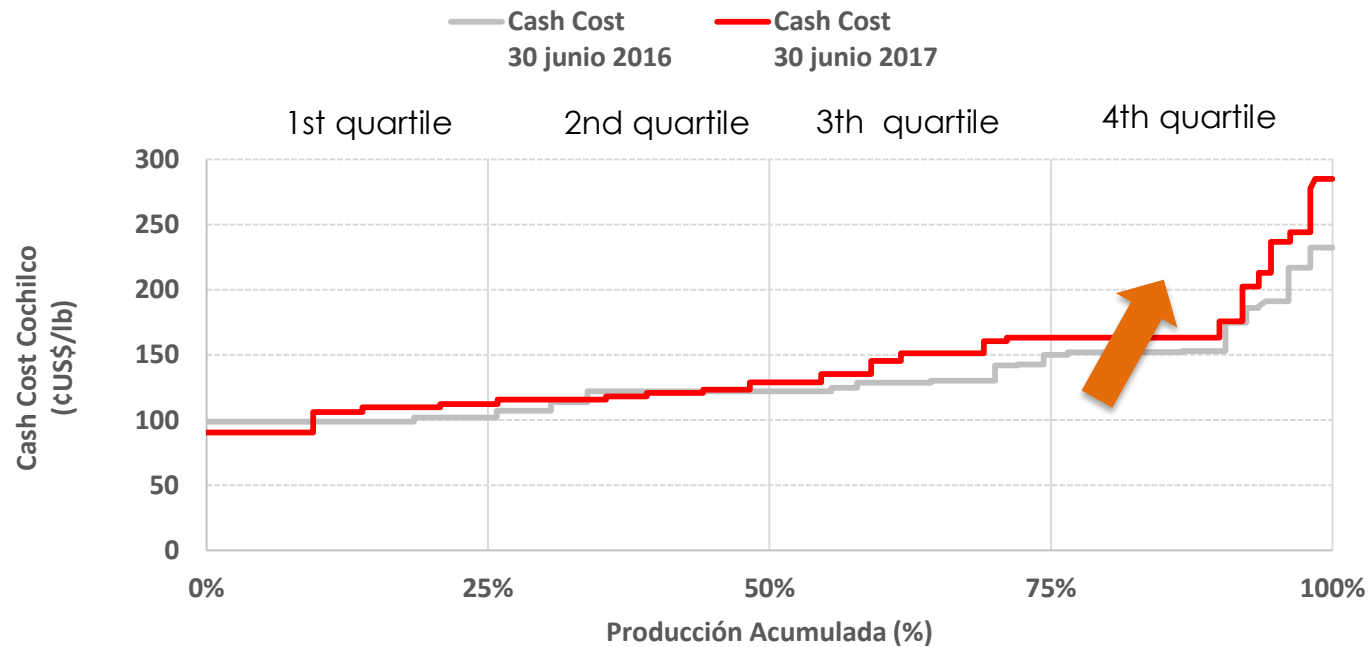


Average	N° Mining Operations	Cash Cost Cochilco (¢US\$/lb)		
		2016 toJun.	2017 a Jun.	Var
Operations that increased costs	13	130,3	155,8	+ 25,5
Operations that decreased costs	8	128,2	119,3	-8,9
Total	21	129,7	137,8	8,0

Source: Cochilco

CASH COST COCHILCO (C1) CURVE

2016 vs 2017 (accumulated up to June)



- Generalized displacement of the cost curve and especially of those operations with higher costs

VARIATION CASH COST COCHILCO (¢US\$/lb) 2016 vs 2017 (accumulated up to June)

Cash Cost Cochilco (¢US\$/lb)

2016 (accumulated to June)	129,7
By product credit	-7,7
Acid	-0,4
TC/RC y Marketing	-0,1
Consumables	0,2
Freight	0,3
Diesel	1,1
Power	2,1
Labour	3,8
Services and Others	8,7
2017 (accumulated to June)	137,8
Variación (¢US\$/lb)	+ 8

Higher Au, Ag and Mo prices => higher credits for by-products

Increase quarterly of power average prices of free client contracts, especially in the SING (+ 21%).

Increase of the diesel (+ 27%)

Slight increase in average own endowments (+ 2%)

Increase item "Services and others", with strong impact of the fall of the dollar.

TC/RC = Treatment and Refining Charges

Source: Cochilco

VARIATION CASH COST COCHILCO (¢US\$/lb) 2016 vs 2017 (accumulated up to June)

Cash Cost Cochilco (¢US\$/lb)

2016 (accumulated to June)	129,7
Quantity Effect (Inputs, workers, q consumptions, etc.)	-1,5
Prices effect (Supplies, Personnel, Consumptions, etc.)	-12,0
CPI effect, exchange rate and IPM USA	7,9
Lower Production	13,7
2017 (accumulated to June)	137,8
Variación (¢US\$/lb)	+ 8

Increase the production of by-products and lower consumption of materials, energy and fuels.

Higher price by-products and lower prices of services, materials, H2SO4 and TC-RC

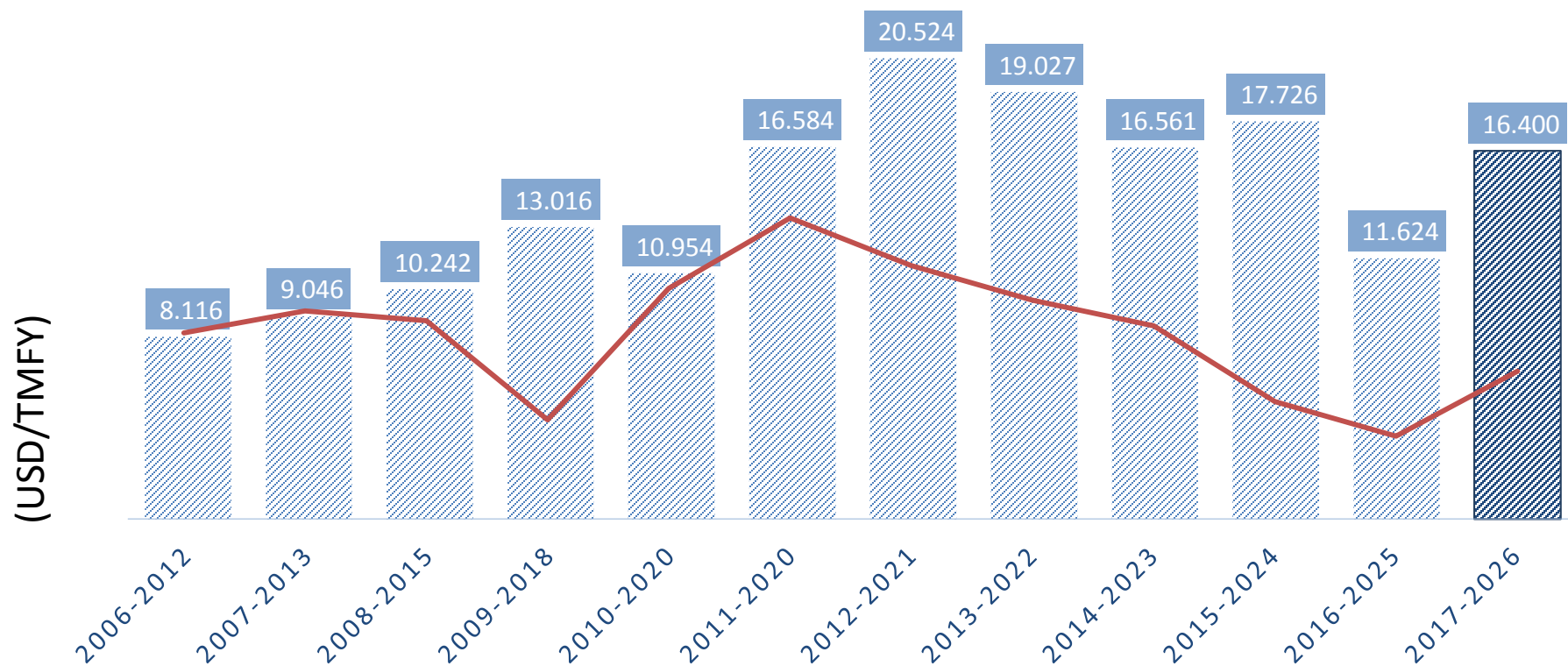
Average price of the dollar falls \$ 30 (-4%) and negatively impacts on costs in Chilean peso

Copper production decreased 252 ktmf (-10%).



04 | FUTURE TRENDS

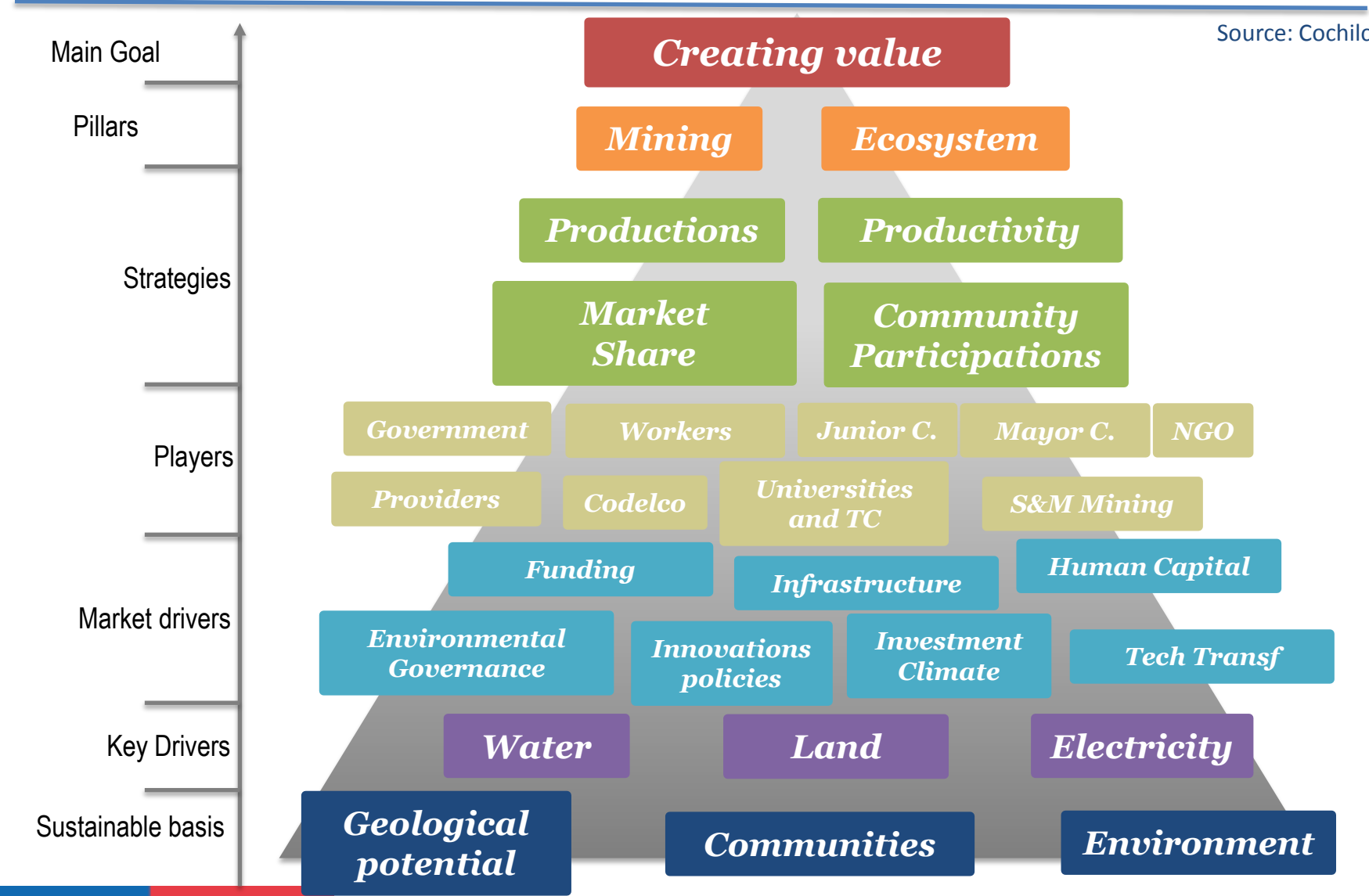
CAPEX INTENSITY TREND FOLLOW THE PRICE



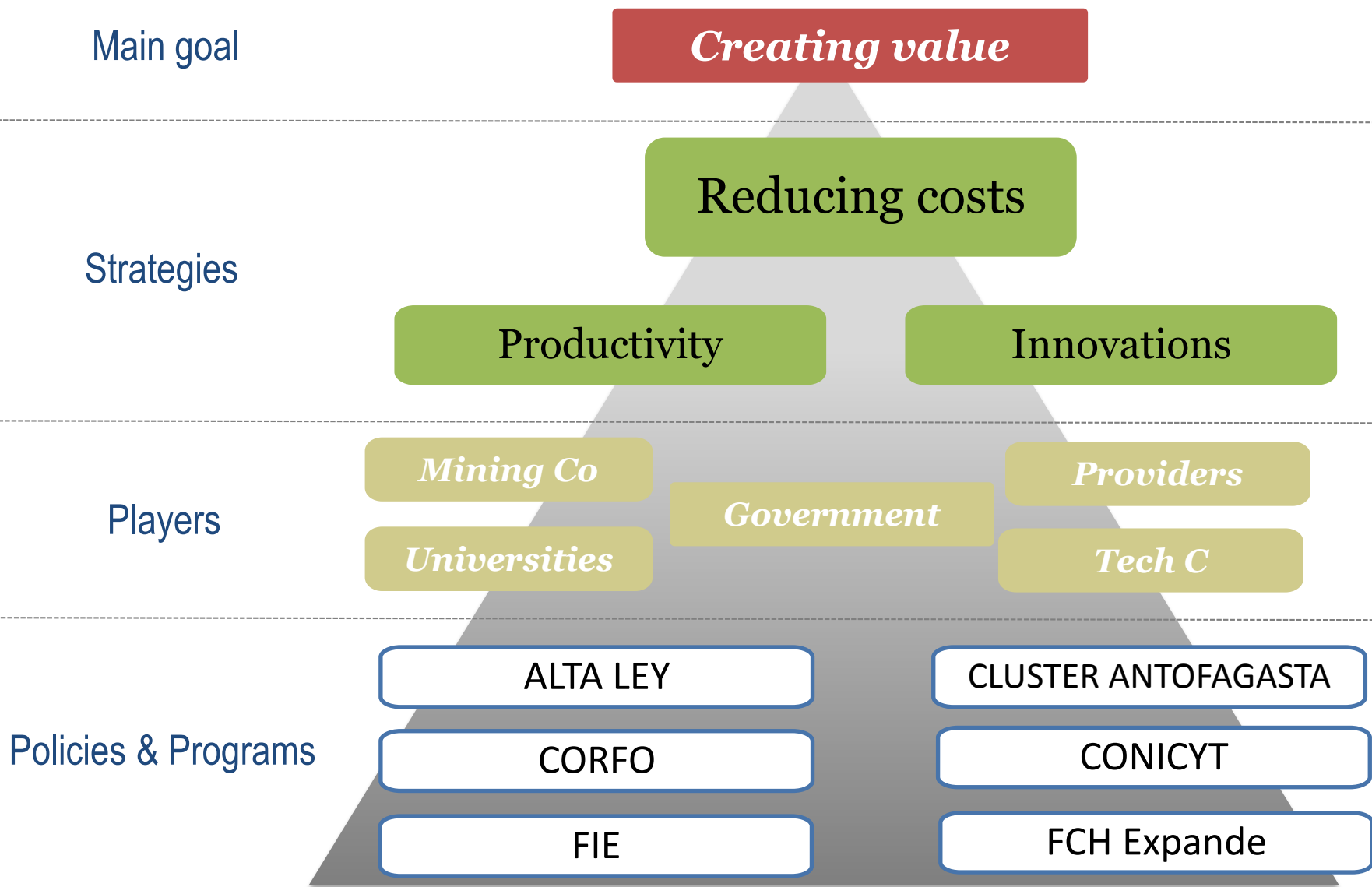
Source: Cochilco

COST CONTROL IS KEY FACTOR FOR LONG TERM SUSTAINABILITY

Source: Cochilco



STRATEGY FOR ENHANCING CASH COSTS COMPETITIVENESS






05 | FINAL REMARKS



FINAL REMARKS

- The Chilean mining lost competitiveness in terms of cash cost, mainly for decreasing in ore grades, and increase in CAPEX because the inflation in the key inputs.
 - In recent years the cost control has becoming a priority for companies and the government and has been one of the focus in the policies.
 - The strategies to recovery cash cost competitiveness is focusing policies in improving productivity and increasing investment in innovation.
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