Chilean Copper Commission
Research Department

Investment in the Chilean Copper and Gold Mining Sector
Estimations for 2008-2012, Revised to August 2008

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Contents

Investment in the Chilean Copper and Gold Mining Sector
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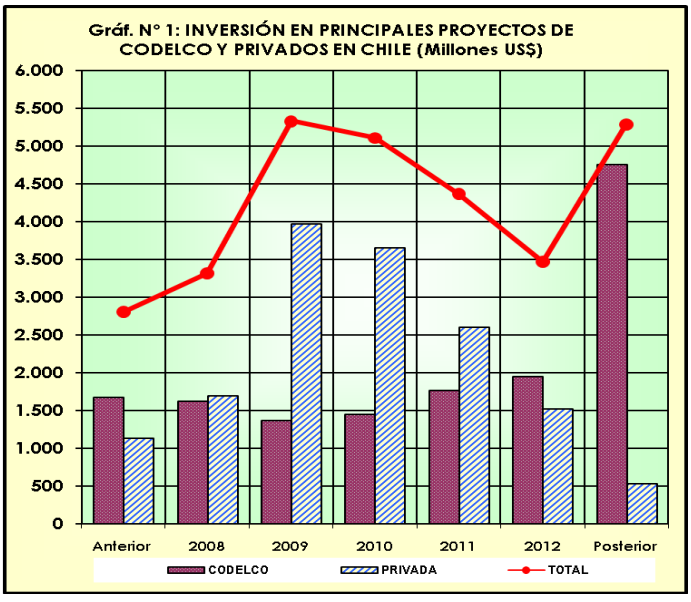
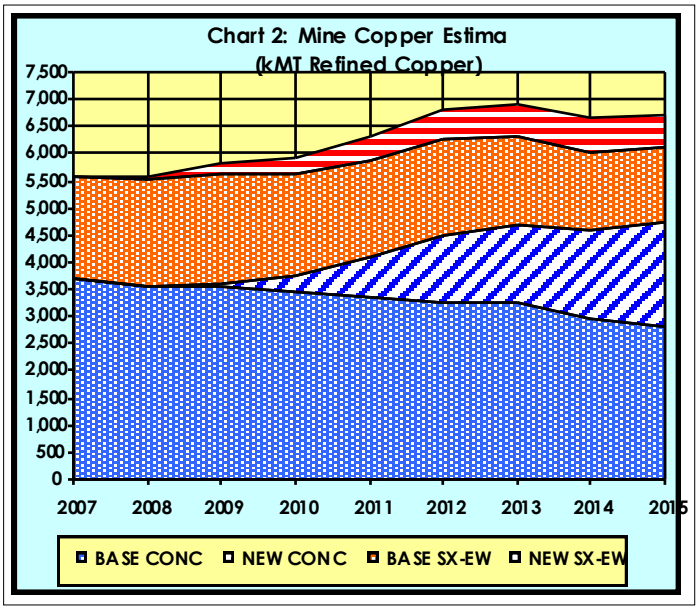
This report estimates investment and attendant production impact in the Chilean copper and gold/silver mining sector. Based on publicly-available information on plans by key mining companies, these regular reports interpret and update relevant information based on the latest available data.

This report has three parts:

- Estimated investments in 2008-2012 by both Codelco and private copper, gold and silver miners, including key project startup timelines.
- Estimated mine copper production (concentrate plus SX-EW cathodes) and smelter and refinery output for 2007-2015, using 2007 as baseline year.
- Brief description of key projects under review.





Source: Cochilco, based on publicly-available reports.

See methodology notes in Annex 1.

I. Investment Estimates for 2008-2012

Planned investments in the Chilean copper and gold mining sector are an estimated US$21.6 billion. Amounts will be especially significant in 2009-2010, particularly in 2009, with an estimated US$5.3 billion.

Codelco is expected to invest slightly over US$8.1 billion. Private sector investment will approach the US$9.8 billion mark. Gold/silver mining should account for a significant US$3.1 billion.

A review of planned projects, including those underway and with a startup date of 2008-2012 and those starting but not necessarily going on stream in that time period, shows overall investment of about US$29.7 billion. Codelco alone accounts for 49.1 percent of planned investment amounts.

Table 1: Expected Investment in the Copper and Gold/Silver Mining Sector (US$ Million)

	Before	2008	2009	2010	2011	2012	Total 08-12	After	Total
Total Investment (1 + 2)	2,808	**3,320**	**5,331**	**5,109**	**4,368**	**3,471**	**21,599**	5,288	**29,695**
1) Copper Mining (1.1 + 1.2 + 1.3)	2,519	**3,230**	**4,811**	**4,559**	**3,393**	**2,471**	**18,464**	4,888	**25,871**
1.1) Codelco	1,676	**1,623**	**1,364**	**1,454**	**1,768**	**1,946**	**8,154**	4,753	**14,583**
1.2) Large Private Miners	756	**1,384**	**3,265**	**3,050**	**1,625**	**525**	**9,849**	135	**10,740**
1.3) Medium-Scale Miners	87	**223**	**182**	**55**	**0**	**0**	**460**	0	**548**
□ Private Medium-Scale Miners	70	204	145	50	0	0	399	0	469
□ ENAMI	17	19	37	5	0	0	61	0	79
2) Gold/Silver Mining	289	**90**	**520**	**550**	**975**	**1,000**	**3,135**	400	**3,824**

Source: Cochilco, based on publicly-available information.

Estimates are based on information available through the end of August 2008. To be sure, the ongoing financial turmoil might yet have an impact on planned projects. While at this writing it is too early for conclusions, this is a significant factor that must be kept in mind.

Table 2 shows key projects scheduled for 2008- 2012.

Table 2: Project Startup Timelines

Startup	Company Name	Project Name	Amount
2008	Antofagasta Min.	Los Pelambres (Mauro tailings dam)	534
	Codelco - Chile	Gabriela Mistral	1,125
	Xstrata	Lomas Bayas expansion	70
2009	Codelco Andina	Expansion to 94,000 TPD (Phase I)	734
	Centenario Copper	Franke	172
2010	Aur Resources	Andacollo Hypogenic	336
	Antofagasta Minerals	Esperanza	1,900
		Los Pelambres (Expansion II)	600
	Cerro Dominador	Diego de Almagro	120
	Collahuasi	Phase I Expansion	750
2011	Anglo American	Los Bronces Expansion	1,744
	Antofagasta Min	Antucoya	200
	Barrick	Pascua	1,500
	Pan Pacific Copper	Caserones	1,500
	Xstrata	Lomas Bayas II	200
2012	Xstrata	El Morro	2,500
2013 and beyond	Barrick	Cerro Casale	2,324
	BHP Billiton	Escondida Phase V	1,000
	Codelco Norte	Ministro Hales Mine	317
	Codelco Andina	Expansion to 230,000 TPD (Phase II)	4,800

Source: Cochilco, based on publicly-available information.

II. Copper Production Estimates

2.1 MINE PRODUCTION[1]

Annual mine copper output by 2015 is expected to stand at 6.72 million tons refined content, up 20.9 percent over the 5.56 million tons posted in 2007.

Planned investment is expected to boost concentrate production (sulfides line) by 26.5 percent and SX-EW cathode production (hydrometallurgical line) by 9.6 percent.

Chart 2 and Table 3 summarize expected mine copper production through 2015, using 2007 as benchmark. Production from existing and planned operations for the period is shown.

[1] Includes concentrate and SX-EW cathodes.

Table 3: Expected Mine Copper Production Through 2015
(kMTF)

Description	Type	2007	2008	2009	2010	2011	2012	2013	2014	2015
Baseline Production	Concentrate	3,725	3,549	3,561	3,438	3,366	3,238	3,256	2,954	2.814
	SX-EW cathodes	1,832	1,952	2,017	1,893	1,790	1,772	1,595	1,442	1.382
Total Baseline Production		**5.557**	**5,501**	**5,578**	**5,331**	**5,156**	**5,010**	**4,851**	**4,396**	**4,196**
New Production	Concentrate	0	6	27	298	711	1,266	1,453	1,611	1.899
	SX-EW cathodes	0	87	224	309	425	540	625	637	625
Total New Production		**0**	**93**	**251**	**607**	**1,136**	**1,806**	**2,078**	**2,248**	**2,524**
Estimated Production	Concentrate	3,725	3,555	3,588	3,736	4,077	4,504	4,709	4,565	4.713
	SX-EW cathodes	1,832	2,039	2,241	2,202	2,215	2,312	2,220	2,079	2.007
Total Estimated Production		**5.557**	**5,594**	**5,829**	**5,938**	**6,292**	**6,816**	**6,929**	**6,644**	**6,720**

Source: Cochilco estimate

New mine production is expected to stand at some 2.52 million tons refined copper (1.9 million tons concentrate and 0.62 million tons SX-EW cathodes). This more than offsets the 1.36-million ton reduction expected from existing operations, mostly concentrate-related.

A review of new mine production and planned investment amounts (see Section 1) reveals a noticeable increase in investment costs, a trend impacting the mining industry worldwide. Comparison of current and late-2007 Chile project portfolios shows a 30 percent increase in investment amounts required to produce a ton of copper.

2.2 SMELTER AND REFINERY PRODUCTION

The Codelco Smelter and Refinery project remains the most significant development in this area. However, Codelco is revising project scope to ensure consistency with mining investment plans and market conditions. As a result, no information on investment amounts or implementation timelines was available as of this writing.

As such, smelter and refinery output estimates through 2015 are based solely on recent additions and operating improvements evident especially in 2009. Production through 2015 is expected to remain stable.

Table 4 shows estimated smelter (anode, blister) production as well as electrolytic and fire-refined copper production.

Table 4: Expected Smelter And Refinery Production Through 2015
(kMTF)

	2007	2008	2009	2010	2011	2012	2013	2014	2015
Total Smelter	1,514	1,540	1,838	1,829	1,823	1,680	1,899	1,859	1,920
Total Refinery	1,105	1,104	1,152	1,157	1,178	1,124	1,332	1,350	1,355

Source: Cochilco estimate

In 2007, Chilean smelters were able to handle 40.6 percent of local copper concentrate production. Expansions in capacity through 2009 should increase this figure to 51.2 percent, which will then decline as concentrate production expands. Electrolytic and FR production capacity in the period should hold steady at around 29 percent.

2.3 REFINED AND MINE PRODUCTION SHARES

This section illustrates the share of mine production (concentrate + SX-EW cathodes) converted into various commercial forms of refined copper (SX-EW cathodes + electrolytic and FR cathodes). Table 5 shows a conversion rate on the order of 53 percent for 2007 which peaks at 58 percent in 2009, then declines to about 50 percent through 2015.

Table 5: Refined And Mine Copper Production Shares Through 2015
(kMTF)

	2007	2008	2009	2010	2011	2012	2013	2014	2015
1) Maximum Concentrate Production	3,725	3,555	3,588	3,736	4,077	4,504	4,709	4,565	4,713
2) Maximum SX-EW Cathode Production	1,832	2,039	2,241	2,202	2,215	2,312	2,220	2,079	2,007
3) Electrolytic and FR Capacity	1,105	1,104	1,152	1,157	1,178	1,124	1,332	1,350	1,355
Percent Cap. Ref. Production (2+3) / Mine Copper Production (1+2)	**52.9**	**56.2**	**58.2**	**56.6**	**53.9**	**50.4**	**51.3**	**51.6**	**50.0**

Source: Cochilco estimate

III. LEADING INVESTMENT PROJECTS

3.1. CODELCO (www.codelco.cl)

GABRIELA MISTRAL (Minera Gaby)

A porphyry copper deposit containing oxidized ores underlying sulfur ores, Gaby stands on the Domeyko Mountain Range, 120 km from Calama near San Pedro de Atacama. Estimated reserves are 541 million tons leachable ores with 0.44% copper content. Ore processing capacity of 80,000 TPD should translate into an estimated 150,000 TPY SX-EW cathodes.

Est. Investment Amount: US$1,125,000,000
Status: SX-EW cathode production underway since May 2008.

PILAR NORTE (Teniente Division)

A project involving development of the northern sector of the mine. It will feed an extra 17,000 TPD to the concentrating plant.

Est. Investment Amount: US$105,000,000
Status: Construction underway, expected operational in 2009.

PHASE I: 94,000 TPD EXPANSION / ANDINA DEVELOPMENT PLAN (Andina Division)

Initial stage of Andina's plan to increase ore extraction and processing capacity to 94,000 TPD as a means to addressing declining grades. Also included are a net 30,000 TPY copper concentrate production increase and linkup work for Phase II.

Est. Investment Amount: US$734,000,000
Status: Construction underway, expected operational in 2009.

PHASE II: 230,000 TPD EXPANSION / NUEVA ANDINA (Andina Division)

Calls for increasing ore extraction and processing capacity to 230,000 TPD. Plans include a new open pit, continuing underground development, and relocating treatment plants to the valley. The expected additional 320,000 tons refined copper should translate into an overall 600,000 TPY copper concentrate.

Est. Investment Amount: US$4,800,000,000 (Includes US$200 million for engineering).
Status: Prefeasibility stage, expected operational in 2015.

RT SULFIDES:

Initial development of sulfurs surfacing at the Radomiro Tomic Mine as overlying oxide layers are depleted. The project calls for extraction and crushing of ores and transportation by conveyor belt to the Chuquicamata concentrating plant for production of an estimated 80,000 TPY. Some sulfurs are already being trucked to Chuquicamata. A second phase involving sulfur leaching and feeding to the SX-EW plant as oxides are depleted is under review.

Est. Investment Amount: US$360,000,000

Status: Work underway, expected operational in 2010.

MINISTRO HALES MINE DEVELOPMENT (Northern Codelco Division)

The Ministro Hales Mine, halfway between Chuquicamata and Calama, is a copper sulfide deposit with an estimated 219 million tons in reserves and 1.13% average grades. Once operational, the site should process up to 50,000 TPD. This should help keep processing capacity at the Northern Codelco Division at current levels and should translate into an additional 165,000-200,000 TPY copper concentrate. High arsenic content will require a dedicated concentrating line plus roasting on a fluidized bed prior to smelting.

Est. Investment Amount: US$317,000,000
Status: Prefeasibility review. Mining and concentrate production expected to commence in 2010 and 2014, respectively.

3.2. MAJOR PRIVATE COPPER MINERS

3.2.1 Anglo American (www.anglochile.cl)

Los Bronces Development (Anglo American Sur)

Project calls for increasing processing capacity from 60,000 TPD to 160,000 TPD, adding 175,000 TPY refined copper to Los Bronces output. Contemplates construction of crushing and milling line and an additional slurry pipeline for transportation to high-capacity copper and molybdenum concentrating plants to be located in the valley.

Est. Investment Amount: US$1,740,000,000
Status: Basic engineering stage completed early next year. Expected operational in 2011 following two year's construction work.

3.2.2 Antofagasta Minerals (www.antofagasta.co.uk)

ESPERANZA (Antofagasta Minerals)

Deposit located 6 km southeast of El Tesoro (Sierra Gorda). Reserves are estimated at 786 million tons sulfides (0.53% copper and 0.2 GPT gold). Expected production is 195,000 TPY copper concentrate with high gold content. Oxides might be dovetailed with El Tesoro mining plan. Processes will require 640 l/sec. seawater and use thickened tailings techniques.

Est. Investment Amount: US$1,900,000,000
Status: Feasibility stage. Production expected to stand at 195,000 TPY copper concentrate and some 200,000 oz./year gold. On stream late 2010.

MAURO TAILINGS DAM (Minera Los Pelambres)

Project involves construction of a 1,600-million ton tailings dam designed to extend life of mine and support eventual expansion of processing capacity.

Est. Investment Amount: US$534,600,000
Status: Construction nearing completion after litigation settlement. Approaching operational status.

LOS PELAMBRES EXPANSION (Minera Los Pelambres)

Subsequent to overhaul underway since early 2007, new plans call for increasing processing capacity from 144,000 to 175,000 TPD. Designed to address declining grades issues, the upgrade should increase copper concentrate production by 80,000 TPY for an overall 440,000 TPY, in addition to molybdenum recovery. Given reserve levels, the expansion, supported by a concurrent increase in tailings dam capacity, is not expected to extend the life of mine.

Est. Investment Amount: US$600,000,000
Status: Under review. Expected operational in 2010.

ANTUCOYA (Minera Michilla)

The Antucoya and Buey Muerto deposits, located east of Antofagasta just south of SQM's Pedro de Valdivia nitrate plants, contain vast leachable, low-grade copper resources. Intended as replacements for the Michilla deposit, whose reserves should run out by 2009.

Est. Investment Amount: US$200,000,000
Status: Prefeasibility review.

3.2.3 BHP Billiton (www.bhpbilliton.com)

ESCONDIDA EXPANSION (Minera Escondida)

Construction of a third concentrating plant supporting increased processing of declining grades in order to offset concentrate production losses expected in coming years. Plant is expected to produce 210,000 TPY copper concentrate.

Est. Investment Amount: US$1,000,000,000
Status: Concept engineering stage; expected operational in 2012.

3.2.4 Doña Inés de Collahuasi (www.collahuasi.com)

COLLAHUASI EXPANSION (SCM Doña Inés de Collahuasi)

Plans calls for increasing overall copper concentrate and SX-EW cathode production to 650,000 TPY. This requires increasing sulfide ore processing capacity and long-term processing of leachable ores. Long-term plans include raising production to 1 million tons refined copper.

Est. Investment Amount: US$750,000,000
Status: Initial construction underway. Expected operational in 2010.

3.2.5 Pan Pacific Copper (www.ppcu.co.jp)

CASERONES (Minera Lumina Copper Chile)

Previously known as Regalito, this deposit stands at 4,200 m ASL, 115 km southeast of Copiapó (Region III). Leachable copper reserves are estimated at no less than 628 million tons (0.43% grades). Initial studies propose heap leaching combined with solvent extraction and electrowinning, for estimated production of 100,000-150,000 TPY SX-EW cathodes.

Est. Investment Amount: US$1,500,000,000
Status: Under review. Conclusions might result in revised investment amounts and product mix. Expected operational in 2011, once review concludes.

3.2.6 Teck Cominco (www.teckcominco.com)

ANDACOLLO SULFIDES (Minera Carmen de Andacollo)

Hypogenic primary sulfide deposit underlying supergenic secondary sulfide ores currently yielding 21,000 TPY SX-EW cathodes by means of leaching. Reserves are estimated at 429 million tons, with 0.39% and 0.13% copper and gold average grades, respectively; total resources are twice as large. Expected annual production stands at 254,000 tons concentrate, including 80,000 tons copper and 66,000 oz. gold.

Est. Investment Amount: US$386,000,000
Status: Feasibility approved. Expected operational in 2010 as leachable ores become depleted.

3.2.7 Xstrata (www.xstrata.com)

LOMAS BAYAS EXPANSION (Minera Lomas Bayas)

Involves expanding cathode production to 75,000 TPY. Due to existing deposit depletion, plans include a new pit 3 km from current site, construction of a new heap leaching facility, and upgrades to existing plant infrastructure. Intent is to extend the life of mine through 2020 and maintain production in spite of low grades.

Est. Investment Amount: US$70,000,000 (Lomas Bayas Expansion)
US$200,000,000 (Lomas Bayas II)
Status: Approved, expected operational in late 2008. Lomas Bayas II feasibility will be reviewed in 2009; might come on stream in 2011.

ALTONORTE EXPANSION (Altonorte Smelter)

Infrastructure overhaul designed to help increase smelting capacity from 816,000 to 1.2 million TPY concentrate, produce 390,000 TPY anodes and one million tons sulfuric acid, and reduce environmental footprint.

Est. Investment Amount: US$75,000,000
Status: Capacity expected to increase gradually starting in 2008.

EL MORRO (XSTRATA & Metallica Resources)

Located 84 km east of Vallenar (Alto del Carmen, Atacama). Reserves are estimated at 487 million tons sulfides (0.56% copper and 0.44 GPT gold). Production is estimated at 155,000 TPY copper concentrate and 330,000 oz. gold for an estimated 15 years.

Est. Investment Amount: US$2,500,000,000
Status: Feasibility completed, although no decision is forthcoming. If construction starts in 2009, concentrate production could get underway in late 2011.

3.3. MEDIUM-SCALE COPPER MINING

3.3.1 Centenario Copper Corp. (www.centenariocopper.cl)

FRANKE (Centenario Copper Chile SCM)
Deposit located south of Region II, within the Salvador Division area of influence. Resources are an estimated 34 million tons leachable oxides and sulfides capable of producing 30,000 TPY SX-EW cathodes, with possible medium-term expansion as new reserves are added.

Est. Investment Amount: US$172,000,000
Status: Construction underway; expected operational in Q1 2009.

3.3.2 Cerro Dominador (www.elbronce.cl)

DIEGO DE ALMAGRO (Minera El Bronce)
Located in Region III, 10 km from Diego de Almagro. An IOCG (iron oxide-copper-gold) deposit with reserves of 300,000 tons copper and 27,000 oz. gold. Plans include leaching oxides and concentrating sulfides to produce 11,000 TPY SX-EW cathodes (years 1-8) and 22,000 TPY copper concentrate (years 2-8).

Est. Investment Amount: US$120,000,000
Status: Feasibility stage. Expected operational in 2010.

3.3.3 ENAMI (www.enami.cl)

DELTA PROJECT
Involves development of the Panulcillo Mine, near Ovalle, whose sulfide ores (50,000 TPM) will be processed by a planned Enami concentrating plant. Plant capacity (60,000 TPM) will be completed by additional ores from other local miners. While Panulcillo is owned by Enami, startup and commissioning will be contracted out to the private sector. Plans also contemplate an oxides project, with Enami to build leaching/SX-EW facilities designed to process ores supplied by Enami leaseholders.

Est. Investment Amount: US$6,400,000 (Panulcillo Mine)
US$44,100,000 (Flotation plant)
US$7,000,000 (Oxides Project)
Status: Engineering stage.

3.4 GOLD AND SILVER MINING

Barrick Gold (www.barrick.com)

PASCUA (Cía. Minera Nevada S.A.)

A gold deposit standing at 4,600 m ASL, 53 km north of the El Indio Mine, Pascua forms a single unit with the Lama deposit on the Argentine side of the border. Global reserves are estimated at 17.1 million oz. gold and 560 million oz. silver, mostly oxides. Three-fourths of reserves lie in Chile (Pascua) and the remainder in Argentina (Lama). An agitation cyaniding plant will be built in the Lama area. Annual production is estimated at 24.9 tons gold and 1,088 tons silver.

Est. Investment Amount: US$1,500,000,000 (about 50 percent of project budget)
Status: Construction approved, although a 2008 commencement date is contingent on the outcome of binational talks. Expected operational in 2011.

CERRO CASALE (Minera Estrella de Oro Ltda.)

A gold and copper sulfides deposit located in Aldebaran, on the southern end of the Maricunga gold district, 100 km due east of Copiapó. Probable reserves are 507 million tons (0.69 GPT gold and 0.25% copper content), in addition to resources estimated at 187 million tons (0.4 GPT gold and 0.24% copper content). Project contemplates co-production of an estimated 30 TPY gold and 125,000 TPY copper concentrate.

Est. Investment Amount: US$2.324.000
Status: Barrick took over the project (51%) following the December 2007 Arizona Star acquisition. Remaining 49% stake is owned by Kinross, which has kept the feasibility study up to date. Due to frequent ownership changes, construction may not be ready to begin before 2010. Commissioning is not expected until 2013.

ANNEX 1
METHODOLOGY

Below is an explanation of the methodology used to compile this report.

1. Scope

Covers existing and planned investments in 2008-2012 by both Codelco and medium- and large-scale private miners.

Investment estimates are allocated on a per-annum basis. For current projects with a commencement date prior to 2008, actual investments made through 2007 are shown as investments prior to 2008. Portions slated to be invested after 2012 are identified as such.

Project particulars are complemented by an estimate of additional copper production contributed, if applicable, plus a note on current status.

Information is provided on a best-guess basis, based on data current at the time of writing. Absent other information, some annual investment allocations are estimates not necessarily supported in sources.

As such, companies are not in any way responsible for the forecasts made in this report.

2. Codelco Investment Plans

While most Codelco investments involve projects yielding a return, the company also invests on equipment replacement, facility upgrades, mining exploration, research and development, feasibility studies, environmental cleanup, and workplace safety.

Codelco investment estimates are based solely on projects submitted to the Investment Authorization (API) process, evaluated jointly by Cochilco and the Ministry of Planning (MIDEPLAN).

These estimates are based primarily on company reports submitted regularly to the Cochilco Strategic Management Assessment Division. These reports have been used to assemble a conservative global investment profile, with additional details on key projects in the public domain.

Estimates presented here are based on the following sources:

a) Investments for 2008 are global approved investment amounts for the year. Specific amounts attributed to each project, however, are unofficial estimates based on Codelco's *Investment Program – Physical Expenditure Advances Report to June 2008*. The Report describes budget implementation, including investment amounts not yet allocated to specific projects (which are allocated to Head Office as a result).

b) Investment figures for 2009 and beyond are global estimates based on the Codelco 2008 *Business and Development Plan* and Division estimation data submitted to Cochilco.

Investment amounts and timelines shown are Cochilco Research Department estimates based on available information. As such, they are not the responsibility of Codelco or of other government agencies involved in authorizing investments.

3. Copper and Gold Mining Investment in the Private Sector

Sources included public reports and announcements culled from company web sites, the news media, trade publications, and the like. As opposed to the Codelco case, this review does not consider routine or exploration investments.

Often only a global investment amount and intended year are known. As such, annual allocations are estimated assuming a 30-month completion timeline for complex projects and generally assigning about half of the investment amount to year two.

Information is shown on a per-company basis, grouping projects by location and majority- or wholly-owned subsidiary.

Enami investment amounts are shown under medium-scale private mining activities due to the fact that its mandate is directly connected to this sector. In addition, Enami's Delta Project is contingent on private investment.

4. Copper Production

Includes copper concentrate and SX-EW cathode production from mine sources, blister/anode production from smelters, electrolytic copper production from refineries, and FR copper production from smelters. All figures are shown as refined copper content using 2007 production as benchmark year, and are estimated based on data available to the Cochilco Research Department.

Mine copper production estimates for 2008-2015 are based on profiles for both existing (Baseline Production) and planned (New Production) operations shown in this report.

Mine production is computed on a per-company basis for each year shown. Company information is included only for referential purposes and is intended to account for changes in production profiles due to gradual depletion of existing operations and/or increases issuing from new project startup. Companies shown are not responsible for this information.

Smelter and refinery production is estimated through 2015 based on both the Altonorte smelter expansion and operating improvements to other smelters and refineries.

The Codelco Smelter and Refinery project remains the most significant development in this area. However, Codelco is revising project scope to ensure consistency with mining investment plans and market conditions. As such, no information on investment amounts or implementation timelines was available as of this writing.

Prepared on behalf of the Cochilco Research Department by

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