



2014 Minerals Yearbook

ANTIMONY [ADVANCE RELEASE]

ANTIMONY

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In the United States, one company in Montana produced antimony metal and antimony oxide by upgrading imported antimony intermediate products. Secondary antimony was recovered as a component of lead alloys from recycled lead-acid batteries at secondary lead smelters.

Reported consumption of primary antimony decreased by 6% from that in 2013 primarily owing to decreases in consumption for use in nonmetal and metal products that were partially offset by an increase in consumption for flame retardants. In 2014, about 33% of the reported primary antimony used in the United States was in flame retardants; most of the remaining antimony was used in ceramics, glass, and lead-base alloys (table 3). Secondary antimony, which was derived almost entirely from antimonial lead contained in recycled lead-acid batteries, was used in the manufacture of new batteries. Global, estimated consumption of antimony in 2014 was slightly less than that in 2013, declining for the fourth consecutive year. The worldwide end-use distribution of antimony in 2014 was estimated to be flame retardants, 50%; lead-acid batteries, 35%; heat stabilizers and plastics, 7%; and other uses, 8%.

Antimony was commercially mined as a principal product or was recovered as a byproduct during the smelting of base metal ores in 11 countries. China was the world's leading producer of primary antimony, accounting for 77% of world mine production, followed by Russia (6%) and Australia (4%) (table 9). Owing primarily to significant decreases in mine production in Burma and South Africa, which had been the second- and fourth-leading producers, respectively, in 2013, estimated global mine production declined by 3% from that in 2013 and was at its lowest level since 2009.

Production

Mine.—On October 14, 2013, First Liberty Power Corp. (FLPC) (Las Vegas, NV) began mining stibnite (antimony trisulfide) ore for upgrade and sale at its Fencemaker antimony project, 194 kilometers northeast of Reno, NV. By February 2014, more than 750 metric tons (t) of raw stibnite ore had been produced and was being stored at a nearby facility for further processing. The company reported that, during 2014, it had been working to acquire additional permits to construct a concentrator and refinery. However, the company experienced financial challenges during 2014 and the mine was placed on care-and-maintenance status in early 2015 (First Liberty Power Corp., 2014; Roskill Information Services Ltd., 2015, p. 241).

During 2014, Midas Gold Corp. (Vancouver, British Columbia, Canada) completed an independent preliminary feasibility study for the Stibnite Gold Project (formerly known as the Golden Meadows Project) in the Stibnite-Yellow Pine mining district in Idaho. The project consisted of the Hangar

Flats, West End, and Yellow Pine deposits and historic tailings. Mining had taken place at project sites intermittently from 1925 through 1997. As of September 2014, total probable antimony reserves were estimated to be 62,200 t of contained antimony and, according to the feasibility study, antimony production at the mines would be about 6,350 metric tons per year (t/yr) during the first 4 years of operation and would last for about 12 years (Midas Gold Corp., 2014, p. 2, 6).

Smelter.—The United States had only one antimony smelter, operated by U.S. Antimony Corp. (USAC) (Thompson Falls, MT) in Montana. The Montana smelter processed intermediate antimony products from Australia, Canada, and Mexico; recovered precious metals; and produced antimony oxide and metal. The company also operated a smelter and mines in Mexico. USAC produced antimony metal for bearings, lead alloys, and ordnance; antimony oxide as a raw material for flame retardants; and sodium antimonite for glass and other applications. USAC also recycled antimony-containing products that would otherwise be discarded. USAC reported that overall antimony production (as contained metal produced in Mexico and the United States) in 2014 was about 784 t (518 t produced in the United States, 266 t in Mexico) compared with 716 t (423 t produced in the United States, 293 t in Mexico) in 2013, an increase of 9%. In 2014, the number of furnaces operating at the company's smelter in Madero, Mexico, increased to 12 from 8, and the added capacity was expected to contribute to USAC's planned production increase to between 1,810 and 2,040 t of antimony in 2015 (U.S. Antimony Corp., 2015a, p. 4, 6; 2015b).

Consumption

Of the 97 companies to which a U.S. Geological Survey (USGS) antimony consumption survey was sent, 76 firms responded. Consumption data were estimated for the remaining 21 firms. Reported consumption of primary antimony decreased by 6% from that in 2013, primarily owing to decreases in consumption for use in nonmetal and metal products (table 2). Lead-antimony alloys were used in ammunition, antifriction bearings, cable sheaths, corrosion-resistant pumps and pipes, roof sheet solder, and tank linings. Antimony oxide was used primarily in conjunction with a halogen to form a flame retardant system for coatings, fiberglass, paper, plastics, rubber, textile goods, and paints. Antimony oxide was also used as a color fastener in paint, as a catalyst for production of polyester resins for fibers and film, as a catalyst for production of polyethylene terephthalate in plastic bottles, and as a phosphorescent agent in fluorescent light bulbs.

Prices

In 2014, the average Platts Metals Week New York dealer price of antimony was 425 cents per pound, a decrease of 8% compared with that in 2013 (table 1). The average monthly price for antimony started 2014 at 435 cents per pound, the peak for the year, and decreased to 400 cents per pound by yearend. Average annual antimony prices in 2014 were at their lowest level since 2010 (fig. 1, table 1). The price declines since 2011 were partially reflective of decreased global consumption owing to continued substitution for antimony in flame retardants following supply disruptions in China and a sharp price increase (Metal Bulletin, 2014).

Foreign Trade

U.S. imports of antimony (metal content) in 2014 were, as has been the case in the recent past, much more than exports—about sevenfold more (tables 5–8). Imports of antimony contained in metal, concentrates, and oxide were 24,200 t, a slight decrease from those in 2013. China was the leading supplier to the United States, accounting for 65% of antimony metal imports and 57% of antimony oxide (metal content) imports in 2014 (tables 7, 8).

World Review

In 2014, global mine production of antimony declined by 3% to 156,000 t from 160,000 t in 2013. China (77%), Russia (6%), and Australia (4%) were the leading global producers of antimony in 2014. Global mine production was about 16% less than it was in 2011 (the historical peak for global antimony mine production) owing primarily to declines in production in Burma, Canada, China, and South Africa that were partially offset by increases in Australia, Bolivia, Russia, and Turkey (table 9).

Globally, most antimony was consumed for use in flame retardants (50%) and in lead-acid batteries (35%). It was estimated that in 2014, global consumption of antimony was about 182,000 t, a slight decline from that in 2013. In 2014, Asia accounted for 56% of global antimony consumption followed by Europe and North America with 19% each (Roskill Information Services Ltd., 2015, p. 4, 111–112).

Australia.—Mandalay Resources Corp. (Toronto, Ontario, Canada) operated the Costerfield gold-antimony mine in Victoria. Mandalay purchased the idle mine in 2009, restarted operations in 2010, and has been making improvements to increase production since then. In 2014, the mine produced 3,640 t of antimony contained in concentrate, an 11% increase from that produced in 2013 and more than twice as much as was produced in 2011 (Mandalay Resources, 2012, 2015).

China.—In 2014, China continued to be the dominant producer of antimony, accounting for about 76% of global antimony mine production. The largest and highest grade deposits were in southern China, with the largest mines in Hunan and Yunnan Provinces and Guangxi Zhuang Autonomous Region. China also was the leading global producer of antimony metal and oxides, leading importer of antimony contained in ore and concentrates, and leading exporter of antimony metal and oxide (Roskill Information Services Ltd., 2015, p. 1, 36).

Antimony mine production was estimated to be about 120,000 t in 2014, unchanged from that in 2013 but about 20% less than that produced in 2011. Production declined owing to tighter environmental controls from the Chinese Government, lower ore grades, and price-related curtailments. In June 2014, China's Ministry of Land and Resources cancelled production quotas for antimony. The cancellation was the first time that the Chinese Government had removed control over antimony mine production since the quota was introduced in 2009. The quota for antimony mine production in 2013 was 89,000 t; however, mine production exceeded the quota as it did in 2012 (Smith, 2014). In December, China's Ministry of Commerce released minor metals export quotas for 2015. During 2015, the total export quota (metal content) for antimony metal and antimony oxide was 59,400 t, the same as in 2014. Most producers and traders did not use all of their allocated export quotas in 2014, however, owing to reduced global antimony consumption (Xu, 2014).

China's consumption of antimony in 2014 was estimated to be about 58,000 t, unchanged from that in 2013 but 18% less than consumed in 2010. Since 2010, antimony consumption in China declined owing to the slowdown in the global economy that reduced demand for some downstream products containing antimony that were produced in China and increased substitution for antimony in flame retardants (Minor Metals Monthly, 2015).

Oman.—In July 2014, Tri-Star Resources plc announced that it had formed a joint-venture company called Strategic and Precious Metals Processing LLC [owned by Tri-Star, the Oman Investment Fund (a sovereign wealth fund of the Sultanate of Oman), and Castell Investments Ltd. (a subsidiary of Dubai Transport Co.)] to construct and operate an antimony roaster in Oman. The roaster would be built in the Sohar Free Trade Zone and have the capacity to produce 20,000 t/yr of antimony metal and antimony oxide and was projected to cost \$60 million to build. It was expected that it would take 18 months to build and commission the plant and production would begin in 2016. Raw materials (sulfide concentrates) were to be imported from Tri-Star's mines in Canada and Turkey (both still in development stages) and from other suppliers, and the antimony metal and oxide produced were expected to be exported primarily to customers in Asia, Europe, and the United States (Spicer, 2014; Tri-Star Resources plc, 2014).

South Africa.—Village Main Reef (Bryanston), an antimony and gold producer, experienced financial difficulties in 2014 and began business rescue proceedings in mid-December after plans to sell its Cons Murch Antimony and Gold Mine to an Australian buyer fell through. Cons Murch was one of the largest antimony ore bodies outside of China, had the capacity to produce about 5,500 t/yr of antimony, and had been a relatively significant antimony producer until 2014. Village Main Reef was hoping to maintain the mine until a suitable buyer could be found (Macmillan, 2015; Roskill Information Services Ltd., 2015, p. 272).

Outlook

Global consumption of antimony is expected to increase from 2015 to 2020 owing to projected increases in the use of antimony in flame retardants, lead-acid batteries, and plastics, primarily in Asia. One industry analyst estimated that global consumption of antimony would reach 206,000 t by 2020, a 13% increase from that in 2014. Asia is expected to continue to be the leading consuming region, accounting for about 60% of global consumption by 2020 (Roskill Information Services Ltd., 2015, p. 192).

Flame retardants are expected to remain the principal use of antimony, globally as well as in the United States. The increase in antimony prices from 2009 to 2011 led some producers of flame retardants to switch to less expensive substitutes where possible. However, if prices continue to decline, substitution for antimony could reverse since antimony is still a preferred synergist in many flame retardant applications.

Antimony recovered from scrap has been an important part of the total domestic antimony supply. Recovery, however, is limited to the quantity contained in end-of-life batteries. Since 2001, a typical automotive lead-acid battery has contained a maximum of 0.6% antimony.

In recent years, lead-acid battery manufacturers have initiated research and development programs that could ultimately lead to significant changes in lead-acid battery design. This research has already yielded performance improvements that could make lead-acid batteries viable options for future generation hybrid vehicles. These batteries might use less lead per battery than conventional lead-acid batteries and could reduce or eliminate the use of antimony in lead-acid battery alloys. Consumption of antimony for batteries in North America has declined over the past few decades as many newer starting, lighting, and ignition battery designs, such as sealed “maintenance free” batteries, are manufactured with alloys of lead and calcium, selenium, or tin instead of antimony owing to performance and price advantages. Lead-antimony alloys are still expected to be used in deep cycle batteries for motive power in boats, forklifts, golf carts, and some standby batteries.

Although production has declined in China and its antimony reserves may be declining, numerous antimony prospects around the world are being explored and developed, and future supplies of antimony are expected to be sufficient to meet demand. Mine projects in Australia, Bolivia, Canada, Kyrgyzstan, and Turkey are in different stages of development and could potentially become new sources of supply (Roskill Information Services Ltd., 2015, p. 192–193, 198).

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TABLE 1
SALIENT ANTIMONY STATISTICS¹

(Metric tons of antimony content unless otherwise specified)

	2010	2011	2012	2013	2014	
United States:						
Mine production	--	--	--	--	--	
Smelter production:						
Primary	W	W	W	W	W	
Secondary	2,630	2,860	3,050	4,410 ^r	4,230	
Exports:						
Metal, alloys, waste and scrap	gross weight	427	581	847	1,550	1,570
Antimony oxide ²		2,120	3,590	3,870	2,420	1,670
Imports for consumption		26,200	23,500	22,600	24,700	24,200
Reported industrial consumption, primary antimony		8,860	8,610	8,050	9,040 ^r	8,520
Stocks, primary antimony, all classes, December 31		1,560	1,430	1,430	1,470	1,400
Price, average ³	cents per pound	401.2	650.3	564.5	462.6	424.8
World, mine production		181,000 ^r	185,000 ^r	178,000 ^r	160,000 ^{r,c}	156,000 ^e

^eEstimate. ^rRevised. W Withheld to avoid disclosing company proprietary data. -- Zero.

¹Data are rounded to no more than three significant digits, except prices.

²Antimony content data were calculated by the U.S. Geological Survey.

³New York dealer price for 99.65% metal, cost, insurance, freight U.S. ports.

TABLE 2
REPORTED INDUSTRIAL CONSUMPTION OF
PRIMARY ANTIMONY IN THE UNITED STATES¹

(Metric tons of antimony content)

Class of material consumed	2013	2014
Metal	1,230	1,100
Oxide	6,440	6,140
Other ²	1,370 ^r	1,280
Total	9,040 ^r	8,520

^rRevised.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes residues and sulfide.

TABLE 3
 REPORTED INDUSTRIAL CONSUMPTION OF PRIMARY ANTIMONY IN THE
 UNITED STATES, BY PRODUCT¹

(Metric tons of antimony content)

Product	2013	2014
Metal products:		
Antimonial lead	W	W
Bearing metal and bearings	21	18
Solder	54	46
Other ²	2,550 ^r	2,380
Total	2,630 ^r	2,440
Nonmetal products:		
Ammunition primers	W	W
Ceramics and glass	W	W
Pigments	1,050	877
Plastics	114	122
Other ³	2,470	2,260
Total	3,630	3,260
Flame retardants:		
Adhesives	84	69
Plastics	2,350	2,440
Rubber	148	139
Textiles	199	172
Total	2,780	2,820
Grand total	9,040 ^r	8,520

^rRevised. W Withheld to avoid disclosing company proprietary data; included in "Other."

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes ammunition, cable covering, castings, sheet and pipe, and type metal.

³Includes fireworks and rubber products.

TABLE 4
 INDUSTRY STOCKS OF PRIMARY ANTIMONY IN
 THE UNITED STATES, DECEMBER 31¹

(Metric tons of antimony content)

Type of material	2013	2014
Metal	261	214
Oxide	789	790
Other ²	424	392
Total	1,470	1,400

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes ore and concentrate, residues, and sulfide.

TABLE 5
 U.S. EXPORTS OF ANTIMONY METAL, ALLOYS, AND WASTE AND SCRAP,
 BY COUNTRY¹

Country	2013		2014	
	Gross weight (metric tons)	Value (thousands)	Gross weight (metric tons)	Value (thousands)
Canada	137	\$612	246	\$1,040
Chile	--	--	64	198
China	45	207	6	27
Germany	4	20	45	140
Guatemala	4	13	--	--
India	14	58	26	81
Italy	62	96	2	5
Japan	78	484	5	17
Korea, Republic of	522	1,360	645	1,960
Mexico	473	1,710	264	1,320
Netherlands	8	24	6	19
Poland	20	62	21	66
Russia	--	--	8	32
Spain	--	--	6	24
Taiwan	3	13	16	50
United Kingdom	106	328	78	242
Venezuela	68	440	118	615
Other	10	103 ^r	15	74
Total	1,550	5,540	1,570	5,920

^rRevised. -- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 6
U.S. EXPORTS OF ANTIMONY OXIDE, BY COUNTRY¹

Country	2013			2014		
	Gross weight (metric tons)	Antimony content ² (metric tons)	Value (thousands)	Gross weight (metric tons)	Antimony content ² (metric tons)	Value (thousands)
Australia	70	58	\$381	97	81	\$389
Belgium	3	2	24	--	--	--
Brazil	2	2	26	--	--	--
Canada	59	49	516	68	56	564
Chile	--	--	--	5	4	39
China	199	165	855	163	135	587
Colombia	143	119	1,020	102	85	900
Costa Rica	66	55	399	19	16	179
France	45	37	179	72	60	217
Germany	265	220	1,000	192	159	779
Hong Kong	--	--	--	27	22	71
India	10	8	49	35	29	142
Indonesia	--	--	--	15	12	105
Japan	233	193	1,510	363	301	2,120
Korea, Republic of	177	147	758	13	11	115
Mexico	957	794	3,970	251	208	1,890
Netherlands	41	34	239	8	7	21
Oman	--	--	--	100	83	390
Singapore	29	24	139	30	25	134
South Africa	--	--	--	16	13	70
Spain	19	16	19	--	--	--
Taiwan	217	180	1,550	149	124	698
Thailand	56	46	146	128	106	677
United Arab Emirates	20	17	222	--	--	--
United Kingdom	85	71	520	71	59	451
Venezuela	212	176	645	81	67	404
Other	11	10	49	6	6	70
Total	2,920	2,420	14,200	2,010	1,670	11,000

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Antimony content data were calculated by the U.S. Geological Survey.

Source: U.S. Census Bureau.

TABLE 7
U.S. IMPORTS FOR CONSUMPTION OF ANTIMONY, BY CLASS AND COUNTRY¹

Country	2013			2014		
	Gross weight (metric tons)	Antimony content ² (metric tons)	Value (thousands)	Gross weight (metric tons)	Antimony content ² (metric tons)	Value (thousands)
Antimony ore and concentrate:						
Austria	4	2	\$32	13	6	\$72
China	98	89	681	129	89	852
India	104	46	398	153	53	388
Italy	286	204	2,670	306	215	2,740
Japan	(3)	(3)	8	(3)	(3)	8
Mexico	2	1	4	4	1	8
Turkey	--	--	--	(3)	(3)	2
Total	494	342	3,790	605	365	4,070
Antimony oxide:						
Austria	--	--	--	1	1	3
Belgium	1,750	1,450	17,000	1,780	1,470	15,200
Bolivia	2,890	2,400	26,100	1,990	1,660	15,500
China	12,400	10,300	85,100	12,100	10,000	80,300
France	510	424	5,730	535	444	5,200
Germany	1	1	9	3	2	21
Hong Kong	20	17	190	60	50	520
India	--	--	--	6	5	68
Italy	16	13	198	--	--	--
Japan	558	463	3,040	717	596	4,190
Korea, Republic of	--	--	--	18	15	84
Mexico	1,160	959	13,700	1,130	935	11,300
Netherlands	--	--	--	16	14	155
Spain	100	83	165	--	--	--
Taiwan	--	--	--	(3)	(3)	4
Thailand	2,500	2,080	5,000	2,900	2,410	5,800
United Kingdom	3	2	30	(3)	(3)	6
Total	21,900	18,200	156,000	21,200	17,600	138,000

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Antimony ore and concentrate content reported by the U.S. Census Bureau. Antimony content of oxide data were calculated by the U.S. Geological Survey.

³Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 8
U.S. IMPORTS FOR CONSUMPTION OF ANTIMONY METAL, BY COUNTRY¹

Country	2013		2014	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Bolivia	42	\$350	61	\$825
Canada	1	328	(2)	194
China	3,880	37,600	4,060	31,800
Germany	(2)	117	(2)	97
Hong Kong	448	4,440	64	589
India	904	9,590	779	7,040
Japan	115	339	187	510
Korea, Republic of	105	669	34	312
Mexico	172	383	290	1,370
Netherlands	--	--	60	561
Peru	303	2,580	325	2,540
United Kingdom	162	1,590	195	2,070
Vietnam	21	189	150	1,370
Other	19	189	3	7
Total	6,170	58,300	6,210	49,300

-- Zero.

¹Data are rounded to no more than three significant digits; may not add to totals shown.

²Less than ½ unit.

Source: U.S. Census Bureau.

TABLE 9
ANTIMONY: WORLD MINE PRODUCTION, BY COUNTRY^{1,2}

(Metric tons, antimony content unless otherwise specified)

Country ³	2010	2011	2012	2013	2014 ^e
Australia ⁴	1,106	1,577	2,481	3,275 ^r	5,800
Bolivia	4,980	3,947	5,088	5,081 ^r	5,500
Burma ^c	4,700 ^r	5,600 ^r	5,900 ^r	7,200 ^r	3,300
Canada ^{e,4}	5,700 ^r	5,800 ^r	4,100 ^r	148 ^{r,5}	--
China ^c	150,000	150,000	136,000 ^r	120,000 ^r	120,000
Kyrgyzstan ^c	700 ⁵	1,500	1,200	1,200 ^r	1,000
Mexico ^c	71	100	169 ⁵	294 ⁵	270
Russia ^c	6,000	6,348 ⁵	7,300 ^r	8,700 ^r	9,000
South Africa ⁴	3,239	3,175	4,500 ^r	5,300 ^r	1,600
Tajikistan ^c	2,000	4,500	4,248 ^{r,5}	4,675 ⁵	4,700
Thailand	738	56	--	--	--
Turkey ^c	1,400	2,400	7,300 ^r	4,600 ^r	4,500
Vietnam	(6)	(6)	(6)	(6)	(6)
Total	181,000 ^r	185,000 ^r	178,000 ^r	160,000 ^r	156,000

^eEstimated. ^rRevised. -- Zero.

¹World totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Includes data available through July 1, 2015.

³In addition to the countries listed, antimony may have been produced in Iran, but information is inadequate to make reliable estimates of output levels.

⁴Antimony content of antimony ore and concentrate, lead concentrates, and lead-zinc concentrates.

⁵Reported figure.

⁶Reported in metric tons, gross weight as follows: 2010—Not available (NA); 2011—NA; 2012—1,199; 2013—2,476; and 2014—2,684. Not included in “Grand total.”

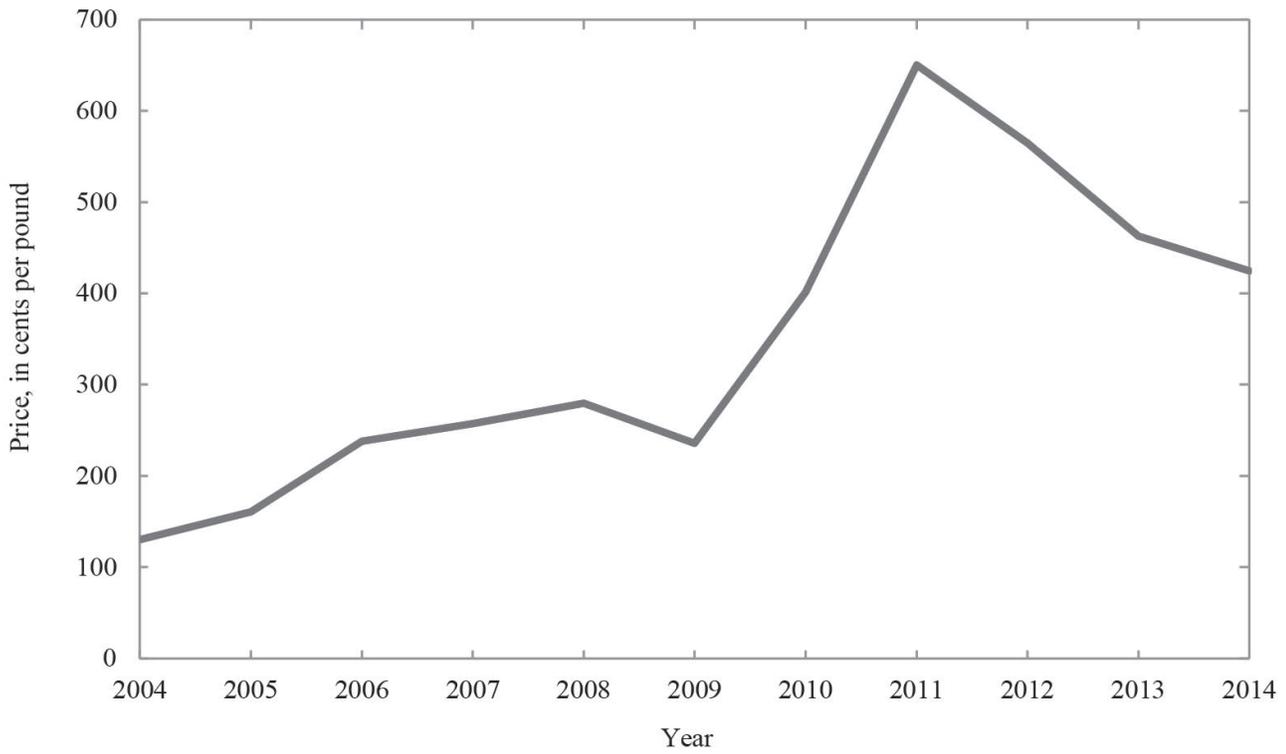


Figure 1. Average annual New York dealer price for 99.5% to 99.6% antimony metal from 2004 through 2014. Source: Platts Metals Week.