



2019 Minerals Yearbook

TIN [ADVANCE RELEASE]

TIN

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Tin has not been mined in the United States since 1993, and primary tin metal has not been produced since the last smelter closed in 1989. Accordingly, the United States is completely reliant on imports and recycling for its tin needs, importing 34,100 metric tons (t) of refined tin during 2019, a 7% decrease from that in 2018 (tables 1, 7). In 2019, the reported amount of primary tin metal consumed domestically was 28,500 t worth an estimated \$545 million, and the reported amount of secondary tin consumed domestically was 4,240 t (tables 1–3). Approximately 10,500 t of tin metal was produced from domestic old scrap (tables 1, 5). Industry stocks at 2019 yearend were 10,300 t, a slight increase from 2018 (tables 1, 4).

World tin mine production was 296,000 t, a 9% decrease from the revised production total in 2019 (tables 1, 9). Of the 21 countries in which tin was mined in 2019, 6 countries accounted for 86% of total production. China was the leading producer (29% of world output), followed by Indonesia (26%), Burma (14%), Peru (7%), Bolivia (6%), and Brazil (5%) (table 9). World primary tin smelter production was 329,000 t (table 10), a 7% decrease from the revised primary tin smelter total in 2018. Total world tin smelter production was 349,000 t in 2019, a 7% decrease from the revised total in 2018 (table 1). According to CRU International Ltd., world refined tin consumption for 2019 was 343,000 t, a 7% decrease from the previous year (CRU International Ltd., 2020, p. 4, 13).

The annual average New York dealer price of \$8.68 per pound for Grade A tin in 2019 decreased by 7% from that in 2018, and the annual average London Metal Exchange Ltd. (LME) cash price was \$8.46 per pound, a 7% decrease from the revised annual average in 2018 (table 1). World tin reserves were estimated to be 4.7 million metric tons, about 16 times the estimated 2019 world primary tin production (Anderson, 2020).

Legislation and Government Programs

Conflict Minerals.—The U.S. Securities and Exchange Commission (SEC) was responsible for implementing section 1502 of the Dodd-Frank Wall Street Reform and Consumer Protection Act, which focused on the use of minerals determined to be financing conflict in Congo (Kinshasa) or adjoining countries. A “conflict mineral” was defined as cassiterite, columbite-tantalite, gold, wolframite, or their derivatives. Cassiterite is one of two principal minerals mined for tin. Section 1502 required companies for which conflict minerals or their derivatives were necessary to the functionality or manufacture of their products to disclose annually whether any of those minerals originated in Congo (Kinshasa) or an adjoining country, also known as “covered countries” (U.S. Securities and Exchange Commission, 2012, p. 56274–56275).

In 2019, 1,083 companies filed conflict minerals disclosures (1,117 companies filed disclosures in 2018). The SEC regulations require companies to perform a reasonable country-

of-origin inquiry to determine the source and chain of custody of potential conflict minerals. In 2019, 50% of companies were able to determine the originating country for minerals used in their products, a decrease from 58% in 2018. Among the companies reporting in 2019, 35% determined that minerals in their products may have originated from a covered country, 14% determined that their minerals did not originate from a covered country, while 1% determined that their minerals came from scrap or recycled sources. The remaining 50% of companies were either unable to make a determination or did not clearly indicate results of their determination. Almost all companies reported that they could not determine whether the minerals financed or benefited armed groups. Only five companies reported definitively that the conflict minerals in some of their products were neither financing nor benefiting armed groups. Although reporting companies were not required to identify which conflict minerals they used, of those that did, an estimated 72% reported using tin (U.S. Government Accountability Office, 2020, p. 1–3, 12–17). Tin concentrate production from Congo (Kinshasa) and adjoining countries has constituted 2% to 4% of world production over the past 5 years (table 9).

In October, the LME announced that it would implement responsible sourcing requirements based on the conflict mineral sourcing framework established by the Organisation for Economic Co-operation and Development. Producers were to use a “red flag assessment” process to address identified red flags and to report their findings. The LME-listed brands would be required to fully comply by 2023 (London Metal Exchange Ltd., 2019).

Foreign Trade.—On May 16, the President of the United States reduced the additional tariff on Turkish imports of steel articles, including tinplate, from 50% to 25%. The tariff was imposed by Presidential Proclamation 9772 on August 10, 2018 (Executive Office of the President, 2018b, 2019a).

On May 19, the President of the United States excluded Canada and Mexico from the 25% tariff on imports of steel products imposed by Presidential Proclamation 9705. Canada and Mexico agreed to prevent unfair subsidies on exported steel products to the United States. The tariff continued to apply to steel products imported from countries other than Argentina, Australia, Brazil, Canada, Mexico, and the Republic of Korea. Steel products affected by these tariffs included varieties of tinplate with the following Harmonized Tariff Schedule of the United States (HTS) codes: 7210.11.00, 7210.12.00, and 7212.10.00. A new HTS code, 9903.80.01, was created to represent the tariffs (Executive Office of the President, 2018a). In 2019, the United States imported 685,000 t of tinplate (table 7), with the exempted countries (Argentina, Australia, Brazil, Canada, Mexico, and the Republic of Korea) providing 32% of tinplate imports. Imports of tin in the form of ore and concentrates, unwrought metal, and waste and scrap,

remained duty free (Executive Office of the President, 2019b; U.S. International Trade Commission, 2019a, b).

Production

Tin has not been mined in the United States since 1993. In 2019, tin recovered from old scrap totaled 10,500 t, a 6% increase from the previous year's total (tables 1, 5). A significant quantity of alloy tin scrap was generated during manufacturing processes and was recycled within those same industries as new scrap; however, data were withheld to avoid disclosing company proprietary data. Secondary tin recovered from obsolete fabricated parts (old scrap) was used in many types of products and was a particularly important source of tin for the manufacture of brass and bronze (table 3). In 2019, the total amount of tin recovered from new scrap was 8,120 t, essentially unchanged from that in 2018. Total tin recovered in 2019 was 18,600 t, a 3% increase from that in 2018 (table 5).

On December 9, MacDermid Alpha Electronics Solutions announced the acquisition of Kester Inc., a worldwide supplier of soldering products. MacDermid Alpha Electronics Solutions is a supplier of specialty materials for the electronic industry. Kester's operations include facilities in Germany, Singapore, and the United States (International Tin Association Ltd., 2019a; MacDermid Alpha Electronics Solutions, 2019).

Consumption

During 2019, tin in the United States was used in chemicals, 22%; tinplate, 18%; alloys, 13%; solder, 11%; bronze and brass, 6%; babbitt, bar tin, and tinning, 4%; and other, 26%, in descending order by weight (table 3). Tin-based chemicals are commonly used in polyvinyl chloride production and biocides, catalysts, curing, and electroplating. Tinplate is a layer of tin adhered to steel or wrought iron substrate for corrosion protection; tin is used in this case to inhibit rust and is commonly used in food-grade cans. Tin alloys are used in brass and bronze products, solders, and low-friction metals. Solder commonly is used in electronic devices for connections on circuit boards.

Domestic consumption data for tin were developed by the U.S. Geological Survey from a voluntary survey of 125 companies that consumed tin. Responses were received from 50 companies. The amount of tin consumed by the companies that did not respond to the survey was estimated based on prior reports or on information from other sources. In 2019, reported consumption of primary tin was 28,500 t, a slight increase from that in 2018. Reported secondary tin consumption in 2019 was 4,240 t, a decrease of 9% from that in 2018 (table 1).

Prices

The S&P Global Platts Metals Week annual average New York dealer price for Grade A tin metal was \$8.68 per pound in 2019, a 7% decrease from the 2018 average New York dealer price of \$9.36 per pound. The LME remained the principal commodity exchange for trading tin. In 2019, the annual average LME cash price for tin was \$8.46 per pound, a 7% decrease from the revised 2018 average LME price of \$9.14 per pound (table 1).

Foreign Trade

The United States imported a total of 753,000 t of tin products valued at \$1.45 billion, a decrease of 4% in quantity and a 6% decrease in value from that in 2018. Refined tin imports, which supplied most domestic primary tin requirements, totaled 34,100 t valued at \$659 million in 2019, a 7% decrease in quantity and a 10% decrease in value from that in 2018. Imports of tin alloys totaled 1,020 t in 2019 valued at \$14.4 million, a 29% decrease in quantity and a 47% decrease in value from that in 2018. The leading tin imports in 2019, by quantity, were tinplate and terneplate, which equaled 685,000 t and were valued at \$720 million, a slight decrease in quantity and essentially unchanged in value from that in 2018 (tables 1, 7). Imports of refined tin to the United States came from Peru (23%), Malaysia (21%), Bolivia (17%), Indonesia (15%), and Brazil (9%) (table 8).

The United States exported a total of 109,000 t of tin products valued at \$178 million, a decrease of 14% in quantity and a slight decrease in value from that in 2018. Refined tin exports in 2019 were 1,300 t valued at \$26.5 million, a 38% increase in quantity and a 40% increase in value from that in 2018. Exports of tin alloys were 1,200 t valued at \$17.8 million, an increase of 36% in quantity and an 11% decrease in value from that in 2018. The leading tin exports in 2019 by quantity, were tinplate and terneplate which equaled 96,600 t and were valued at \$72.5 million, a decrease of 12% in quantity and a decrease of 9% in value from that in 2018 (tables 1, 6).

World Review

According to an annual survey by the International Tin Association Ltd., the world's 10 leading refined tin producers and their production in 2019 were PT Timah Tbk. (Indonesia), 76,400 t; Yunnan Tin Group Co. Ltd. (China), 72,000 t; Malaysia Smelting Corp. (Malaysia), 24,300 t; Minsur S.A. (Peru), 19,600 t; Yunnan Chengfeng Non-ferrous Metals Co. Ltd. (China), 19,100 t; Empresa Metalúrgica Vinto S.A. (Bolivia), 11,500 t; Thailand Smelting and Refining Co. Ltd. (Thailand), 10,900 t; Metallo Chimique International N.V. (Belgium), 9,300 t; Guangxi China Tin Group Co. Ltd. (China), 8,200 t; and Gejiu Zili Mining and Metallurgy Co. Ltd. (China), 8,000 t. The top two producers, PT Timah and Yunnan Tin, reported a 129% increase and an 8% decrease, respectively, in production from that in 2018. Overall production by the top 10 refined tin producers increased by 14% in 2019 from that in 2018 (International Tin Association Ltd., 2020).

Australia.—In February, mining commenced at the Granville tin project in Tasmania, owned by Aus Tin Mining Ltd. (Australia). The processing facility transitioned from low-grade stockpiled ore to high-grade mined material to produce tin concentrates. In March, Aus Tin Mining terminated its contract with its civil engineering and mining services contractor and Aus Tin Mining began “owner mining” at Granville. In September, Aus Tin Mining suspended operations at the Granville mine owing to equipment failure at the mine (Aus Tin Mining Ltd., 2019a, b; 2020, p. 22).

China.—In September, 14 Chinese refined tin companies agreed to reduce production by approximately 10%, or

20,200 t, in 2019, in an effort to steady falling tin prices. The companies included, in decreasing order of 2019 production, Yunnan Tin (72,000 t), Yunnan Chengfeng Nonferrous Metals Co. (19,100 t), and Guangxi China Tin (8,200 t). These companies were 3 of the top 10 producers of refined tin in the world and, combined, the companies produced about 90% of China's refined tin. The closure of the Baiyinchagan Mine in Inner Mongolia and reduced concentrate imports from Burma limited tin concentrate availability in China. Market conditions also created thin margins with low tin metal prices on the LME and the Shanghai Futures Exchange (Argus Metals International, 2019; International Tin Association Ltd., 2019c, 2020). Chinese smelters produced 166,000 t of tin in 2019, a 9% decrease from that in 2018 (table 10).

Congo (Kinshasa).—Alphamin Resources Corp. commenced commercial production at the Bisie tin project in September and reported producing 5,216 t of tin in concentrate during 2019. Approximately 70% recovery was achieved by the processing plant by yearend 2019 with 72% recovery stated as the overall target. For 2020, the company anticipated production of 9,000 to 10,000 t of tin in concentrate at the Bisie project (Alphamin Resources Corp., 2019; 2020, p. 2).

Germany.—On May 22, Aurubis AG (Germany) announced the acquisition of copper and tin recycling company Metallo Group (Belgium). Aurubis, a refining company and Europe's largest copper producer, agreed to purchase Metallo Group for \$422 million. The acquisition required approval by antitrust authorities within the European Union. In November, the European Commission initiated an investigation of the proposed acquisition to determine if competition would be negatively affected. A final decision by the European Commission was expected in 2020 (Aurubis AG, 2019; European Commission, 2019a; Hunter, 2019).

India.—On June 11, the European Commission rejected the proposed merger of ThyssenKrupp AG's European steel operations with India's Tata Steel Ltd. The European Commission had concerns that the merger would reduce competitive steel prices for the automotive and packaging industries, including manufacturers of tinplate. In August, ThyssenKrupp filed a complaint with the European Commission (European Commission, 2019b; ThyssenKrupp AG, 2019).

Indonesia.—In July, Indonesian state-owned PT Timah Tbk., the leading tin producer in the world in 2019, reduced refined tin exports by 1,000 to 1,500 metric tons per month (t/mo) early in the year and further reduced tin exports by 2,000 to 2,500 t/mo by October. The company confirmed that low tin prices were the reason for the reduction in exports. PT Timah produced 76,400 t of refined tin in 2019 (Arisandy, 2019; International Tin Association Ltd., 2019b, 2020).

Namibia.—On August 18, AfriTin Mining Ltd. announced that production of tin concentrate had commenced at the Uis project in Namibia. This followed the completion of the Phase 1 pilot plant in July. In November, the company completed its inaugural shipment of 6 t of tin concentrate to Thailand Smelting and Refining Co. Ltd. In December, the plant processed 5,800 t of ore with plans to increase the plant to its full capacity of 45,000 t/mo during the first half of 2020. At full capacity, the company estimated that the plant would produce

approximately 60 t/mo of tin concentrate (AfriTin Mining Ltd, 2019, 2020).

Outlook

Tin is a vital component of the electronics and packaging industries. As such, the demand for tin is closely tied to these industries. Demand for tin over the next 5 to 10 years is expected to stay consistent with levels seen within the previous 5 years. In 2019, global consumption for tin was lower than the previous year, and this trend is expected through the short term, with demand expected to pick up when consumer electronic demand improves.

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TABLE 1
SALIENT TIN STATISTICS¹

(Metric tons, tin content, unless otherwise specified)

	2015	2016	2017	2018	2019
United States:					
Production, secondary, contained tin from old scrap ^c	10,100	9,960	10,000	9,900	10,500
Exports, refined tin	807	1,150	1,560	941	1,300
Imports for consumption, refined tin	33,600	32,200	34,300	36,800	34,100
Consumption, reported:					
Primary	23,900	22,500	23,300	28,000	28,500
Secondary	2,940	2,920	3,100	4,680	4,240
Stocks, yearend, U.S. industry ²	7,090	6,370	6,660	10,100	10,300
Price, average: ³					
Platts Metals Week New York dealer, Grade A cents per pound	756.43	839.10	936.65	935.87	868.08
London Metal Exchange Ltd., cash do.	729.18	815.22 ^r	911.22 ^r	914.29 ^r	846.43
World, production:					
Mine	307,000	309,000 ^r	341,000 ^r	323,000 ^r	296,000
Smelter:					
Primary	334,000 ^r	342,000	351,000 ^r	355,000 ^r	329,000
Secondary	22,800	22,400	22,800	19,300	19,800
Total	357,000 ^r	365,000	373,000 ^r	374,000 ^r	349,000

^cEstimated. ^rRevised. do. Ditto.

¹Table includes data available through April 30, 2021. Data are rounded to no more than three significant digits, except prices; may not add to totals shown.

²Includes primary, secondary, in process, jobbers-importers, and pig tin afloat to the United States.

³Source: S&P Global Platts Metals Week.

TABLE 2
U.S. CONSUMPTION OF PRIMARY AND SECONDARY TIN¹

(Metric tons, tin content)

	2018	2019
Stocks, January 1 ²	9,220	8,670
Net receipts during year:		
Primary	28,100	28,400
Secondary	2,890	2,460
Scrap	2,210	2,150
Total receipts	33,200	33,000
Total available	42,300	41,700
Tin consumed in manufactured products:		
Primary	28,000	28,500
Secondary	4,680	4,240
Total	32,700	32,700
Intercompany transactions in scrap	389	353
Total processed	33,000	33,100
Stocks, December 31 (total available less total processed)	9,230	8,590

¹Table includes data available through April 30, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes tin in transit in the United States.

TABLE 3
U.S. CONSUMPTION OF TIN, BY FINISHED PRODUCT¹

(Metric tons, tin content)

Product	2018			2019		
	Primary	Secondary	Total	Primary	Secondary	Total
Alloys, miscellaneous ²	3,270	11	3,280	4,250	W	4,250
Babbitt	378	25	403	318	W	318
Bar tin	461	--	461	495	--	495
Bronze and brass	867	1,400	2,260	776	1,060	1,840
Chemicals	7,150	W	7,150	7,290	W	7,290
Solder	4,170	W	4,170	3,740	W	3,740
Tinning	427	--	427	423	W	423
Tinplate ³	5,760	W	5,760	5,820	W	5,820
Other ⁴	5,490	3,250	8,740	5,360	3,170	8,540
Total	28,000	4,680	32,700	28,500	4,240	32,700

W Withheld to avoid disclosing company proprietary data; included with "Other." -- Zero.

¹Table includes data available through April 30, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes terne metal.

³Includes secondary pig tin and tin acquired in chemicals.

⁴Includes britannia metal, collapsible tubes and foil, jewelers' metal, pewter, tin powder, type metal, and white metal.

TABLE 4
U.S. INDUSTRY YEAREND TIN STOCKS¹

(Metric tons)

	2018	2019
Plant raw materials:		
Pig tin:		
Primary ²	8,140	8,120
Secondary	577	513
In process ³	501	511
Total	9,220	9,140
Additional pig tin:		
Jobbers-importers	909	W
Afloat to United States	2	W
Total	911	1,170
Grand total	10,100	10,300

W Withheld to avoid disclosing company proprietary data.

¹Table includes data available through April 30, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

²Includes tin in transit in the United States.

³Data include only tin content of scrap.

TABLE 5
U.S. STOCKS, RECEIPTS, AND CONSUMPTION OF NEW AND OLD SCRAP AND TIN RECOVERED, BY TYPE OF SCRAP¹

(Metric tons)

Type of scrap	Gross weight of scrap						Tin recovered ^e		
	Stocks, January 1	Receipts	Consumption			Stocks, December 31	New	Old	Total
			New	Old	Total				
2018:									
Copper-base scrap: ^c									
Ingot makers	3,370	43,600	W	W	43,500	3,400	(2)	(2)	(2)
Brass mills ³	W	W	W	W	W	W	(2)	(2)	(2)
Foundries and other plants	685	3,380	W	W	3,360	699	(2)	(2)	(2)
Lead-base scrap	19,600	889,000	27,900	863,000 ^f	892,000	W	(2)	(2)	(2)
Tin-base scrap ⁴	W	W	W	W	W	W	(2)	(2)	(2)
Total	XX	XX	XX	XX	XX	XX	8,110	9,900	18,000
2019:									
12									
Ingot makers	3,400	44,000	W	W	44,000	3,400	(2)	(2)	(2)
Brass mills ³	W	W	W	W	W	W	(2)	(2)	(2)
Foundries and other plants	699	3,300	W	W	3,300	710	(2)	(2)	(2)
Lead-base scrap	W	891,000	W	W	900,000	7,810	(2)	(2)	(2)
Tin-base scrap ⁴	W	W	W	W	W	W	(2)	(2)	(2)
Total	XX	XX	XX	XX	XX	XX	8,120	10,500	18,600

^eEstimated. ^fRevised. W Withheld to avoid disclosing company proprietary data. XX Not applicable.

¹Table includes data available through April 30, 2021. Data are rounded to no more than three significant digits; may not add to totals shown.

²Withheld to avoid disclosing company proprietary data; included in totals.

³Consumption is assumed to be equal to receipts.

⁴Includes tinplate and other scrap recovered at detinning plants.

TABLE 6
U.S. EXPORTS OF TIN IN VARIOUS FORMS¹

Form	2018		2019	
	Quantity (metric tons, gross weight)	Value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)
Unwrought:				
Refined tin	941	\$18,900	1,300	\$26,500
Tin alloys	885	19,900	1,200	17,800
Wrought:				
Tin bars, rods, profiles, and wire	6,010	44,700	5,480	46,600
Tin foil	20	320	51	345
Tin plates, sheet, and strip	2,280	4,700	1,080	3,550
Tin tubes, pipes, and tube and pipe fittings	171	2,560	186	3,160
Tin waste and scrap	5,980	4,570	2,470	2,270
Tin flakes and powders	285	4,610	274	5,070
Tinplate and ternplate	110,000	79,800	96,600	72,500

¹Table includes data available through September 24, 2020. Data are rounded to no more than three significant digits.

Source: U.S. Census Bureau.

TABLE 7
U.S. IMPORTS FOR CONSUMPTION OF TIN IN VARIOUS FORMS¹

Form	2018		2019	
	Quantity (metric tons, gross weight)	Value (thousands)	Quantity (metric tons, gross weight)	Value (thousands)
Unwrought:				
Refined tin	36,800	\$731,000	34,100	\$659,000
Tin alloys	1,430	27,400	1,020	14,400
Wrought:				
Tin bars, rods, profiles, and wire	1,460	26,400	1,450	32,400
Tin foil	91	3,290	56	1,960
Tin plates, sheet, and strip	89	459	58	418
Tin tubes, pipes, and tube and pipe fittings	143	572	196	499
Tin waste and scrap	47,700	15,700	30,400	11,200
Tin flakes and powders	189	5,310	117	3,520
Tin oxides	590	11,100	211	4,110
Tinplate and ternplate	696,000	720,000	685,000	720,000

¹Table includes data available through September 24, 2020. Data are rounded to no more than three significant digits.

Source: U.S. Census Bureau.

TABLE 8
U.S. IMPORTS FOR CONSUMPTION OF REFINED TIN,
BY COUNTRY OR LOCALITY¹

Country or locality	2018		2019	
	Quantity (metric tons)	Value (thousands)	Quantity (metric tons)	Value (thousands)
Belgium	112	\$2,430	327	\$6,520
Bolivia	6,310	130,000	5,940	115,000
Brazil	2,740	56,900	3,020	57,900
Canada	61	1,150	25	819
China	1,310	26,700	1,340	27,300
Estonia	--	--	480	10,200
Indonesia	10,500	189,000	5,230	93,100
Malaysia	7,590	155,000	7,120	137,000
Peru	6,660	138,000	7,930	154,000
Poland	731	16,000	1,080	22,400
Russia	--	--	845	17,300
Singapore	50	991	--	--
Taiwan	119	2,540	20	399
Thailand	422	9,030	600	12,100
Other	171	3,430	202	4,470
Total	36,800	731,000	34,100	659,000

-- Zero.

¹Table includes data available through September 24, 2020. Data are rounded to no more than three significant digits; may not add to totals shown.

Source: U.S. Census Bureau.

TABLE 9
TIN: WORLD MINE PRODUCTION, BY COUNTRY OR LOCALITY¹

(Metric tons, tin content)

Country or locality	2015	2016	2017	2018	2019
Australia	7,158	6,635	7,402	6,871	7,738
Bolivia	20,135	17,460	18,341 ^r	17,251 ^r	17,000 ^c
Brazil	18,900 ^r	19,705 ^r	17,081 ^r	17,591 ^r	13,993
Burma ^{e,2}	41,000	57,000	67,500	54,600	42,000
Burundi ^c	45	14	140 ^r	200 ^r	240
China	110,156	97,200	95,500 ^r	90,000 ^c	84,500
Congo (Kinshasa) ^c	5,000	7,100	11,000	9,800 ^r	12,200
Indonesia	70,361	69,621	83,000	85,000	77,468
Laos	512	1,117	1,083 ^r	1,551 ^r	1,400 ^c
Malaysia	4,125	4,158	3,894	3,868 ^r	3,611
Mongolia	64	39	25	25	25 ^c
Namibia	--	--	--	--	10
Nigeria ³	2,500	2,300	8,300	7,800	5,800
Peru	19,511	18,789	17,790	18,601	19,853
Portugal	42	54	81	111 ^r	100 ^c
Russia	578	627	1,011 ^r	1,530 ^r	1,800
Rwanda ^c	2,400	2,200	3,000	3,000 ^r	2,300
Tanzania	179	138	91 ^r	8 ^r	10 ^c
Thailand, mineral concentrate	72	92	541	75	73
Uganda	135	63	66	26 ^{r,c}	91 ^c
Vietnam	4,530	4,579	5,000 ^r	5,500 ^r	5,500
Total	307,000	309,000 ^r	341,000 ^r	323,000 ^r	296,000

^cEstimated. ^rRevised. -- Zero.

¹Table includes data available through September 8, 2020. All data are reported unless otherwise noted. Totals and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Includes tin content of tin-tungsten concentrate.

³Tin content is estimated as 62% of reported gross weight of concentrate.

TABLE 10
TIN: WORLD SMELTER PRODUCTION, BY COUNTRY OR LOCALITY^{1,2}

(Metric tons, tin content)

Country or locality	2015	2016	2017	2018	2019
Belgium, secondary	8,860	8,540	9,700	9,330	9,300
Bolivia, primary	15,464	16,810	16,648 ^r	15,611 ^r	14,000 ^e
Brazil, primary	16,531 ^r	12,542	13,796	12,900	11,927
China, primary	167,200	182,500	178,400 ^r	182,000 ^r	166,000
Greece, secondary	--	--	50 ^e	50 ^e	--
India:					
Primary	17	9	15 ^r	18 ^r	19
Secondary	3,800 ^e	3,800 ^e	3,000 ^e	--	--
Total	3,817	3,809	3,015 ^r	18 ^r	19
Indonesia, primary	67,400	66,900	80,000	81,427	76,389
Japan, primary	1,688	1,620	1,624	1,650 ^r	1,547
Malaysia, primary	30,209	26,758	27,200	27,197	24,320
Norway, secondary ^e	50	50	50	50	--
Peru, primary	20,396	19,390	17,906	18,255	19,555
Rwanda, primary	400 ^e	-- ^e	-- ^e	--	1,000 ^e
Spain, secondary	10 ^e	11	35	-- ^e	-- ^e
Thailand, primary	10,616	10,807	10,588	10,721 ^r	9,600
United States, secondary ^e	10,100	9,960	10,000	9,900	10,500
Vietnam, primary	4,382	4,919	4,400 ^r	4,900 ^r	4,800
Grand total	357,000 ^r	365,000	373,000 ^r	374,000 ^r	349,000
Of which:					
Primary	334,000 ^r	342,000	351,000 ^r	355,000 ^r	329,000
Secondary	22,800	22,400	22,800	19,300	19,800

^eEstimated. ^rRevised. -- Zero.

¹Table includes data available through September 9, 2020. All data are reported unless otherwise noted. Grand totals, U.S. data, and estimated data are rounded to no more than three significant digits; may not add to totals shown.

²Whenever possible, total output has been separated into primary (from ores and concentrates) and secondary (tin metal recovered from old scrap). Data reflect metal production at the first measurable stage of metal output.