COPPER.[1]

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After the war broke out it was generally believed that the copper industry would suffer seriously from the stopping of export trade to countries that had taken a considerable part of the American production and from decrease in the use of copper for ordinary purposes elsewhere. This belief found expression in the immediate curtailment by the larger producers of 30 to 50 per cent, and some small producers ceased operations entirely.

By the beginning of 1915 it was becoming apparent that the early fears of a disastrous effect of the war on the copper industry of this country were without foundation. There was a steadily increasing demand for copper, with a corresponding increase in price which, with slight fluctuations, has continued through the years 1915 and 1916 and into 1917.

As soon as it became apparent that the demands could not be supplied by the existing plants, steps were taken to increase the producing capacity. Many mines were able to respond quickly to the new demands, but the response of metallurgic plants was not so rapid. The flotation process, which was just being introduced in many concentration plants, served a double purpose by increasing the capacity of mills without the necessity of greatly enlarging the general plants and by producing a concentrate of higher grade, thus adding to the capacity of the smelters. Several of the large smelters had recently been rebuilt or were in process of reconstruction, so that the smelting plants of the country were unusually well prepared to meet exceptional demands. It was possible to make enlargements rapidly enough to furnish all the copper that could be treated by refineries. The refineries have been the slowest to respond but in 1917 will probably be able to refine all the copper required, though in May, 1917, enlargements of plants were still being made.

The changes in the copper industry during the last decade are shown in the accompanying table, compiled by the Geological Survey, and are graphically set forth in the diagram (Pl. I).

[1] For a more detailed discussion of the copper industry and the copper districts the reader is referred to U. S. Geol. Survey Mineral Resources, 1915, pt. 1, pp. 656-722, 1916.

Principal features of copper industry, 1907–1916.

Year.	Refined copper, primary.	Secondary copper.	Smelter production, domestic ores.	Imports.
	Pounds.	*Pounds.*	*Pounds.*	*Pounds.*
1907	1,032,500,000	.....	868,900,000	252,600,000
1908	1,137,900,000	.....	942,500,000	218,700,000
1909	1,391,000,000	.....	1,092,900,000	321,800,000
1910	1,422,000,000	.....	1,080,000,000	344,000,000
1911	1,433,800,000	214,000,000	1,097,000,000	334,600,000
1912	1,568,100,000	275,000,000	1,243,000,000	410,000,000
1913	1,615,000,000	273,000,000	1,224,000,000	408,700,000
1914	1,533,700,000	255,700,000	1,150,000,000	306,000,000
1915	1,634,200,000	392,200,000	1,388,000,000	315,600,000
1916	2,259,000,000	[a] 662,000,000	1,928,000,000	462,000,000
Average	1,502,750,000	345,000,000	1,201,400,000	337,400,000

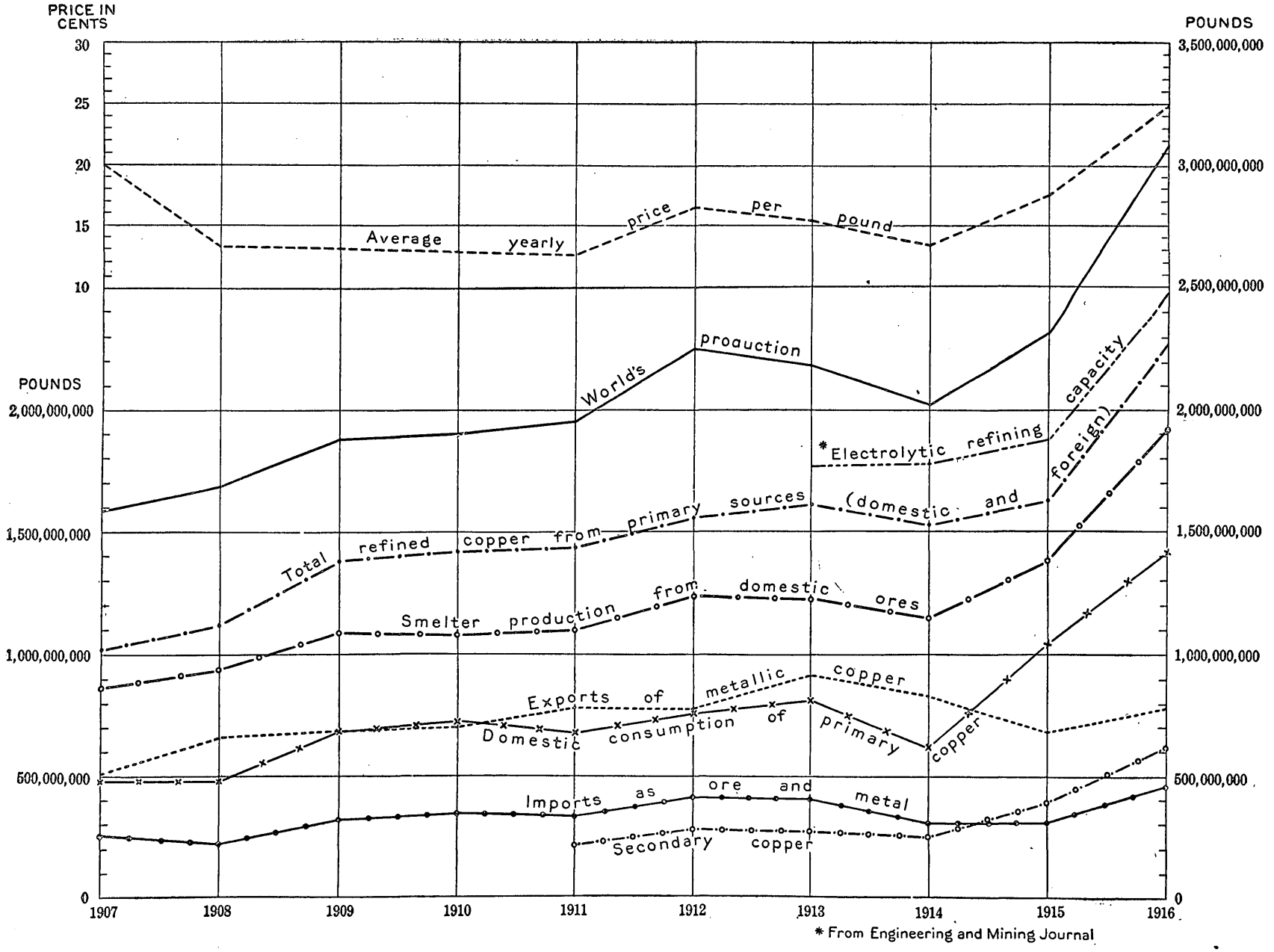
Year.	Exports of metallic copper.	Domestic consumption.	Average yearly price per pound.	World's production.
	Pounds.	*Pounds.*		*Pounds.*
1907	508,900,000	487,700,000	$0.200	1,589,000,000
1908	661,800,000	479,900,000	.132	1,683,000,000
1909	682,800,000	688,500,000	.130	1,875,000,000
1910	708,000,000	732,000,000	.127	1,903,000,000
1911	786,500,000	681,700,000	.125	1,958,000,000
1912	775,000,000	755,900,000	.165	2,259,000,000
1913	926,000,000	812,000,000	.155	2,198,000,000
1914	840,000,000	620,000,000	.133	[b] 2,036,000,000
1915	681,900,000	1,043,000,000	.175	[b] 2,339,000,000
1916	784,000,000	1,430,000,000	.246	[b] 3,078,000,000
Average	735,500,000	773,000,000	.163	2,092,000,000

[a] Preliminary figures, subject to correction. [b] From Engineering and Mining Journal.

The Survey reports a rather steady increase in the production from domestic ores up to the beginning of the war, which was followed by a sharp decline for a few months, and this in turn by a very rapid increase that has continued into 1917. The enlargement of existing plants and the addition of plants in construction during 1916 will permit a continued increase for 1917 if the stimulus of high prices also continues. The steady increase in the amount of copper recovered from scrap is an important factor in the supply.

Imports of copper as ore and blister copper for treatment had, like domestic production, been steadily increasing before the war and also suffered a decline when the war began, followed by an increase. There is likely to be a more rapid increase for the next few years, owing to the added production in South America, Cuba, and some other countries, though this may be offset to some extent by the refining in Canada of some blister copper from producers whose output has previously been refined in this country.

Exports of metallic copper had showed a rather steady increase until the beginning of the war, after which they declined rapidly, owing to the cutting off of exports to the central powers. There has been some recovery, but for 1916 the exports were still below those of the period immediately preceding the war. The exports of copper in



CURVES SHOWING PRINCIPAL FEATURES OF COPPER INDUSTRY, 1907–1916.

manufactured form, however, were notably larger. Exports of metallic copper in 1917 have thus far been much larger than those for any equal period in 1916. During the war the exports of copper in raw or manufactured form are likely to continue at the present rate and possibly to increase. Domestic consumption during the last two years has greatly increased over that preceding the war, though much of the copper consumed was exported in manufactured form.

The price of copper has varied greatly during the last 10 years. At the beginning of that period it was exceptionally high, as it has also been in the last two years. The averages of the yearly average price of electrolytic copper for the 10 years preceding the war, 1904 to 1913, as given by the Engineering and Mining Journal and by the American Metal Market and Daily Iron and Steel Report, were, respectively, 15.060 cents and 15.550 cents a pound. For the five years preceding the war, 1909 to 1913, the averages were 13.941 and 14.300 cents. From a date early in 1915 to the end of 1916 there was a general upward trend in the price, interrupted by declines for short periods. In the early months of 1917 the upward tendency apparently ceased, and there has been a slight decline that seems likely to persist, owing to the fact that refinery production now seems to equal the demand.

It has not been possible for the Survey to compile data showing the average cost of all the copper produced. For several years before the war a large proportion of the copper was produced at a cost of less than 10 cents a pound, and it was the general belief that the average cost of the production did not exceed 10 cents. The curtailment of production at the beginning of the war doubtless caused an increase in average cost, even with the lowering of wages. The great increase in production that followed gave opportunity to operate plants to their full capacity, and in spite of increase in cost of labor and material many companies showed a decrease in cost of copper in 1915 over previous years. More copper was doubtless produced at a cost of 10 cents or less a pound in 1916 than in any previous year, though the increase in the amount of copper produced from mines that are not operated at normal prices, together with some increase in the cost of much of the copper, possibly resulted in a slight increase in the average cost of the output for 1916 as compared with the average before the war.

The known supply of copper ore in the United States has been greatly increased during the last few years. This gain has been due in part to the development of deposits but even more to the improvement in mining and metallurgic methods. It is doubtless safe to say that for several years mining and metallurgic improvements have added to the reserves more copper in material that was previously

below commercial grade than has been extracted during the same period. The copper that is being made available in the tailings of earlier operations would in some districts doubtless go far toward equaling the current production.

There is much difference of opinion regarding the future demand for copper produced in the United States. Some factors regarding this demand seem to be fairly certain. As long as the war continues there will doubless be a large if not increasing demand. At the end of the war there will be a large need of metals for reconstruction. When normal conditions are restored there will have been a very large increase in the copper-producing capacity of countries outside of the United States, including South America, Africa, British Columbia, Japan, Russia, and other countries, as well as in that of this country, and unless the increased consumption continues the competition in the copper market will be keener than before the war. The consumption will doubtless be largely influenced by the price, and the continuance of the industry on the present scale will probably necessitate a very great reduction in the price.