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# *Trends in the World Aluminum Industry*

By

STERLING BRUBAKER

Baltimore: The John Hopkins Press for Resources for the Future. 1967.

Pp. xiv, 260, \$6.95 (hard cover)

Recent exploration and development of major bauxite resources in West Africa and Australia have expanded the geographical pattern of the aluminum industry. The Australian deposits, first discovered only 13 years ago, are currently estimated to contain some 35 percent of the known bauxite resources of the world and the deposits of Guinea almost 20 percent. Future metal production at or tributary to these new centers will make further changes in the industrial pattern.

Sterling Brubaker's study and report are thus timely contributions to this expanding situation which involves not only natural resources but also power and transportation in no small measure.

In describing the aluminum industry and projecting its trends, Brubaker, who is well-known in the field of mineral economics, goes beyond the usual statistical summary. He reviews the growth and trade patterns of the several contributing countries and discusses in essential detail those economic and political features which influence the location and operation of the industry.

This book should appeal to mineral economists and industry leaders primarily because it sets prescribed limits in the treatment of a large subject. It deals with production and consumption, the cost structure of the industry, and changes that may be expected in the future. Operations of the major international companies are described together with data on several of the smaller companies. Trade policies and barriers are treated at some length. In addition, the book is a nice example of publishing skill. The attractive end papers, designed as maps with aluminized shine, show the world expanse of the industry. The step by step explanations used by the author in working out his projections help the reader to follow the analytical process.

In discussing aluminum-bearing materials, the author describes the two main types of bauxite, their chemical differences and qualities. Since the industry, with only minor exceptions, is using bauxite as its raw material little attention is given to low-grade alumina sources.

Extraction of alumina by the Bayer process, with modifications as required for variations in composition of the bauxitic raw ma-

terial, is explained in terms readily understood. The author carries this type of explanation through the processes for reducing alumina to aluminum metal.

Cost factors are discussed for alumina and ingot metal production and alternatives are compared both as to cost and efficiency. Plant capacity is related to costs, capital and operating, to show relative advantages of specific plant sizes in selected countries.

Transportation and power, major items in the cost of production, are analyzed in detail in respect to selection of sites for alumina and metal producing facilities. Bauxite is found largely in tropical countries distant from metal-consuming markets. Electricity is required in large amounts for smelting. With some 4 to 6 tons of bauxite needed to produce 1.9 tons of alumina which is further reduced to one ton of aluminum metal, it is evident that transportation and electric power are critical to plant site selection.

In discussing these relationships, the author finds that one-tenth of a cent of power cost per kilowatt-hour, under stated conditions, is equivalent to the cost of transporting two tons of alumina some 3700 to 5000 miles by ship or a ton of ingot metal some 3000 miles. By using this approach, the author tends to simplify the problem of site selection and renders a precise service to the reader.

Alumina production, formerly concentrated in metal producing areas, is now swinging to bauxite producing regions to save transportation costs. Bauxite production moved from Europe, where it was concentrated in the 1920's, to the Caribbean as of the end of World War II. And now, Africa and Australia are coming in as major future suppliers. With its hydropower potential, West Africa may well become a center of aluminum production in the not-too-distant future. The Southwest Pacific area has a similar potential. Much will depend on political stability.

Essential statistics are presented as background for the text. Data on production and consumption of aluminum are tabulated and reviewed for selected countries and continental areas and also for Communist and non-Communist countries. Consumption is given per capital for the period since World War II and projections of future demand are made to 1980.

The author states that "the presumed real advantage of producing for export in less developed countries hinges upon savings anticipated in power, transportation and labor costs."

Availability of electric power for metal production (smelter operation) is investigated at some length for each of the several countries now producing metal and for those likely to become producers. Costs are compared for electric energy produced from ther-

mal, hydropower, and nuclear plants. Specific data are given which indicate the prospective gap in power costs between non-industrial countries may be considerably less than generally thought.

In addition to being a useful reference on the aluminum industry, this book will attract readers interested in world affairs, especially as they relate to and are influenced by industrial raw materials and products. If there are any reservations to be made about the author's deductions they would probably relate to the swiftly changing political situations in the world today.

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