

## SODA ASH

(Data in thousand metric tons unless otherwise noted)

**Domestic Production and Use:** The total value of domestic natural soda ash (sodium carbonate) produced in 2021 was estimated to be about \$1.8 billion<sup>1</sup>, and the quantity produced was 12 million tons, about 20% more than that of the previous year. The U.S. soda ash industry comprised four companies in Wyoming operating five plants and one company in California operating one plant. The five producing companies have a combined annual nameplate capacity of 13.9 million tons (15.3 million short tons). Borax, salt, and sodium sulfate were produced as coproducts of sodium carbonate production in California. Chemical caustic soda, sodium bicarbonate, and sodium sulfite were manufactured as coproducts at several of the Wyoming soda ash plants. Sodium bicarbonate was produced at an operation in Colorado using soda ash feedstock shipped from the company's Wyoming facility.

Based on 2021 quarterly reports, the estimated distribution of soda ash by end use was glass, 49%; chemicals, 28%; miscellaneous uses, 8%; distributors, 5%; soap and detergents, 5%; flue gas desulfurization, 3%; pulp and paper, 1%; and water treatment, 1%.

**Salient Statistics—United States:**

	<u>2017</u>	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021<sup>e</sup></u>
Production <sup>2</sup>	12,000	11,900	11,700	9,990	12,000
Imports for consumption	19	51	115	98	80
Exports	6,990	6,960	7,020	5,590	6,500
Consumption:					
Apparent <sup>3</sup>	5,040	4,980	4,830	4,480	5,400
Reported	4,910	4,850	4,720	4,440	5,300
Price, average sales value (natural source), free on board (f.o.b.) mine or plant:					
Dollars per metric ton	146.26	148.69	153.24	145.67	155
Dollars per short ton	132.68	134.89	139.02	132.15	141
Stocks, producer, yearend	293	297	289	305	290
Employment, mine and plant, number <sup>e</sup>	2,600	2,600	2,600	2,400	2,400
Net import reliance <sup>4</sup> as a percentage of apparent consumption	E	E	E	E	E

**Recycling:** No soda ash was recycled by producers; however, glass container producers use cullet glass, thereby reducing soda ash consumption.

**Import Sources (2017–20):** Turkey, 81%; Bulgaria and Mexico, 4% each; and other, 11%.

<u>Tariff:</u>	<u>Item</u>	<u>Number</u>	<u>Normal Trade Relations</u> <u>12–31–21</u>
	Disodium carbonate	2836.20.0000	1.2% ad valorem.

**Depletion Allowance:** Natural, 14% (domestic and foreign).

**Government Stockpile:** None.

**Events, Trends, and Issues:** Production, exports, and consumption in 2021 nearly returned to levels seen before the global COVID-19 pandemic. More than one-half of U.S. production of soda ash was exported, and exports were estimated to have increased by 16% compared with those in 2020. Domestic consumption reported by producers increased by about 19% in 2021 compared with that in 2020, and apparent consumption in 2021 increased by about 21% compared with that in 2020.

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Relatively low production costs and lower environmental impacts provide natural soda ash producers some advantage over producers of synthetic soda ash. The production of synthetic soda ash normally consumes more energy and releases more carbon dioxide than that of natural soda ash. In recent years, U.S. producers of natural soda ash were able to expand their markets when several synthetic soda ash plants were closed or idled in other parts of the world.

After increasing capacity during the past 4 years, total production capacity in Turkey was estimated to be between 4 million and 5 million tons per year, and soda ash shipments in Turkey, especially for export, were expected to increase during the next few years. Total United States imports, mostly from Turkey, have recently been about 100,000 tons per year, which was more than double the average quantity of annual imports during the past decade.

**World Mine Production and Reserves:** Reserves for Turkey were revised based on Government and industry reports.

	<b>Mine production</b>		<b>Reserves<sup>5, 6</sup></b>
	<b><u>2020</u></b>	<b><u>2021<sup>e</sup></u></b>	
Natural:			
United States	9,990	12,000	<sup>7</sup> 23,000,000
Botswana	250	260	400,000
Ethiopia	18	20	400,000
Kenya	220	250	7,000
Turkey	4,200	4,400	880,000
Other countries	<u>NA</u>	<u>NA</u>	<u>280,000</u>
World total, natural (rounded)	14,700	17,000	25,000,000
World total, synthetic (rounded)	<u>40,400</u>	<u>42,000</u>	<u>XX</u>
World total (rounded)	55,100	59,000	XX

**World Resources:**<sup>6</sup> Natural soda ash is obtained from trona and sodium carbonate-rich brines. The world's largest deposit of trona is in the Green River Basin of Wyoming. About 47 billion tons of identified soda ash resources could be recovered from the 56 billion tons of bedded trona and the 47 billion tons of interbedded or intermixed trona and halite, which are in beds more than 1.2 meters thick. Underground room-and-pillar mining, using conventional and continuous mining, is the primary method of mining Wyoming trona ore. This method has an average 45% mining recovery, whereas average recovery from solution mining is 30%. Improved solution-mining techniques, such as horizontal drilling to establish communication between well pairs, could increase this extraction rate and enable companies to develop some of the deeper trona beds. Wyoming trona resources are being depleted at the rate of about 15 million tons per year (8.3 million tons of soda ash). Searles Lake and Owens Lake in California contain an estimated 815 million tons of soda ash reserves. At least 95 natural sodium carbonate deposits have been identified in the world, the resources of only some of which have been quantified. Although soda ash can be manufactured from salt and limestone, both of which are practically inexhaustible, synthetic soda ash is costlier to produce and generates environmental wastes.

**Substitutes:** Caustic soda can be substituted for soda ash in certain uses, particularly in the pulp and paper, water treatment, and certain chemical sectors. Soda ash, soda liquors, or trona can be used as feedstock to manufacture chemical caustic soda, which is an alternative to electrolytic caustic soda.

<sup>e</sup>Estimated. E Net exporter. NA Not available. XX Not applicable.

<sup>1</sup>Does not include values for soda liquors and mine waters.

<sup>2</sup>Natural only.

<sup>3</sup>Defined as production + imports – exports + adjustments for industry stock changes.

<sup>4</sup>Defined as imports – exports + adjustments for industry stock changes.

<sup>5</sup>The reported quantities are sodium carbonate only. About 1.8 tons of trona yield 1 ton of sodium carbonate.

<sup>6</sup>See Appendix C for resource and reserve definitions and information concerning data sources.

<sup>7</sup>From trona, nahcolite, and dawsonite deposits.