

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 2022 was an estimated \$1.4 billion¹ and the quantity produced was an estimated 11 million tons, slightly less than that in 2021. 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 nameplate capacity of 13.9 million tons per year (15.3 million short tons per year). 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 2022 quarterly reports, the estimated distribution of soda ash by end use was glass, 48%; chemicals, 28%; miscellaneous uses, 8%; distributors, 5%; soap and detergents, 5%; flue gas desulfurization, 4%; pulp and paper, 1%; and water treatment, 1%.

Salient Statistics—United States:

	<u>2018</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022^e</u>
Production ²	11,900	11,700	9,990	11,300	11,000
Imports for consumption	51	115	^e 98	^e 130	100
Exports	6,960	7,020	5,590	6,900	6,400
Consumption:					
Apparent ³	4,980	4,810	^e 4,480	^e 4,450	4,600
Reported	4,850	4,720	4,440	4,640	4,600
Price, average unit value of sales (natural source), free on board (f.o.b.) mine or plant:					
Dollars per metric ton	148.69	153.24	140.70	133.37	140
Dollars per short ton	134.89	139.02	127.64	120.99	130
Stocks, producer, yearend	297	289	305	278	260
Employment, mine and plant, number ^e	2,600	2,600	2,400	2,400	2,400
Net import reliance ⁴ 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 (2018–21): Turkey, 89%; Bulgaria, 3%; Mexico, 2%; and other, 6%.

<u>Tariff:</u>	<u>Item</u>	<u>Number</u>	<u>Normal Trade Relations</u>
			<u>12–31–22</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 2022 continued at similar levels as seen before the global coronavirus disease 2019 (COVID-19) pandemic. More than one-half of U.S. production of soda ash was exported, but exports for 2022 were estimated to have decreased by 7% compared with those in 2021. Domestic consumption reported by producers and apparent consumption in 2022 were close to the amounts consumed in 2021.

China produced an estimated 27 million tons of mostly synthetic soda ash in 2022 and was the leading producing country followed by, in descending order, the United States and Turkey. Other countries annually producing 1 million tons or more were France, Germany, Italy, Poland, and Russia.

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Relatively low production costs and lower environmental impacts provide U.S. 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.

After increasing capacity of natural soda ash during recent 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, have increased during the past 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:

	Mine production		Reserves^{5, 6}
	<u>2021</u>	<u>2022^e</u>	
Natural:			
United States	11,300	11,000	⁷ 23,000,000
Botswana	262	260	400,000
Ethiopia	^e 18	20	400,000
Kenya	^e 250	250	7,000
Turkey	^e 4,200	4,400	880,000
Other countries ⁸	<u>NA</u>	<u>NA</u>	<u>280,000</u>
World total, natural	<u>16,000</u>	<u>16,000</u>	<u>25,000,000</u>
World total, synthetic	<u>40,100</u>	<u>42,000</u>	<u>XX</u>
World total, natural and synthetic	56,100	58,000	XX

World Resources:⁶ 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 810 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.

^eEstimated. E Net exporter. NA Not available. XX Not applicable.

¹Does not include values for soda liquors and mine waters.

²Natural only.

³Defined as production + imports – exports ± adjustments for industry stock changes.

⁴Defined as imports – exports ± adjustments for industry stock changes.

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

⁶See Appendix C for resource and reserve definitions and information concerning data sources.

⁷From trona, nahcolite, and dawsonite deposits.

⁸China is thought to produce natural trona but because the majority of soda ash production is synthetic, China's production is included in "World total, synthetic".