

SODA ASH

(Data in thousand metric tons unless otherwise specified)

Domestic Production and Use: The total value of domestic soda ash (sodium carbonate) produced in 2023 was an estimated \$1.9 billion¹ and the quantity produced was an estimated 11 million tons, slightly less than that in 2022. The U.S. soda ash industry consisted of 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 2023 quarterly reports, the estimated distribution of soda ash by end use was glass, 47%; chemicals, 29%; miscellaneous uses, 9%; distributors, 5%; soap and detergents, 5%; flue gas desulfurization, 3%; pulp and paper, 1%; and water treatment, 1%.

<u>Salient Statistics—United States:</u>	<u>2019</u>	<u>2020</u>	<u>2021</u>	<u>2022</u>	<u>2023^e</u>
Production ²	11,700	9,990	11,300	11,300	11,000
Imports for consumption	115	98	130	61	8
Exports	7,020	5,590	6,840	6,490	6,600
Consumption:					
Apparent ³	4,830	4,470	4,580	4,740	4,100
Reported	4,720	4,440	4,640	4,640	4,500
Price, average unit value of sales (natural source), free on board (f.o.b.) mine or plant:					
Dollars per metric ton	153.24	140.70	133.37	178.52	180
Dollars per short ton	139.02	127.64	120.99	161.95	160
Stocks, producer, yearend	289	317	278	364	300
Employment, mine and plant, number ^e	2,600	2,400	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 (2019–22): Turkey, 92%; Mexico, 2%; United Kingdom, 2%; Bulgaria, 1%; and other, 3%.

<u>Tariff:</u>	<u>Item</u>	<u>Number</u>	<u>Normal Trade Relations</u>
			<u>12–31–23</u>
	Disodium carbonate	2836.20.0000	1.2% ad valorem.

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

Government Stockpile: None.

Events, Trends, and Issues: Estimates for production, exports, and consumption in 2023 were still at levels lower than those before the global coronavirus disease 2019 (COVID-19) pandemic. Production was slightly lower than that in 2022 whereas estimated exports increased slightly. Reported and apparent consumption both decreased, by 3% and 13%, respectively, compared with those in 2022. More than one-half of U.S. soda ash production was exported in 2023.

China produced an estimated 29 million tons of soda ash in 2023 (most of which was synthetic) and was the leading producing country followed by, in descending order, Turkey and the United States. These three countries accounted for 78% of world production in 2023.

Relatively low production costs and lower environmental impacts provide natural soda ash producers in Turkey and the United States 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.

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

	Mine production		Reserves ^{5, 6}
	<u>2022</u>	<u>2023^e</u>	
Natural:			
United States	11,300	11,000	⁷ 23,000,000
Botswana	285	270	16,000
Ethiopia	^e 18	20	400,000
Kenya	^e 280	280	7,000
Turkey	^e 11,500	11,000	840,000
Other countries ⁸	<u>NA</u>	<u>NA</u>	<u>280,000</u>
World total, natural	23,400	23,000	25,000,000
World total, synthetic	<u>42,100</u>	<u>42,000</u>	<u>XX</u>
World total, natural and synthetic	65,500	65,000	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 estimated to produce natural trona but because the majority of soda ash production is synthetic, China's production is included in "World total, synthetic."