

Wyoming Trona Industry Overview



TATA CHEMICALS (SODA ASH) PARTNERS

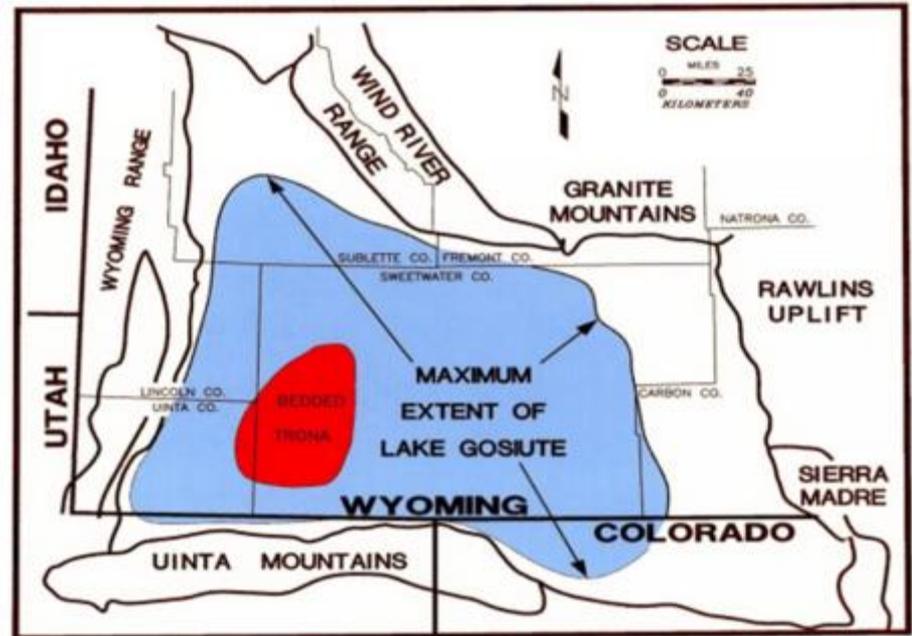


TRONOX



Wyoming Trona

- About fifty to sixty million years ago, a shallow, expansive body of water called Lake Gosiute covered the Green River Basin in southwestern Wyoming.
- Lake Gosiute existed for about 4 million years. Trona was deposited during the 2nd million years while the climate was arid and the lake stopped overflowing and became saline.
- Exactly how it formed and what were the sources of carbon dioxide and high concentration of sodium, both of which are required to create Trona, is still somewhat of a mystery.
- The Trona reserve in southwestern Wyoming is the largest and purest in the world. The total reserve contains over 100 billion tons of trona, 40 billion tons are minable with conventional methods.



Wyoming Trona Industry

- Trona was discovered in Sweetwater County in 1938 during oil and gas exploration.
- The first mine shaft was sunk in 1946, and commercial soda ash production began in 1948. Up until that time, all soda ash in the United States was produced synthetically.
- Today the four Wyoming producers mine over 18 million tons of trona each year and directly employ over 2,300 people.
- The trona is brought to the surface where it is refined into soda ash. The soda ash is then shipped by trucks, trains and ships to markets across the United States and the world.
- About 50% of the almost 12 million tons of soda ash produced in Wyoming is now exported to markets overseas. It is Wyoming's top export and the largest inorganic chemical exported from the USA.
- The Wyoming trona industry contributes approximately \$100 million each year to state taxes and royalties.



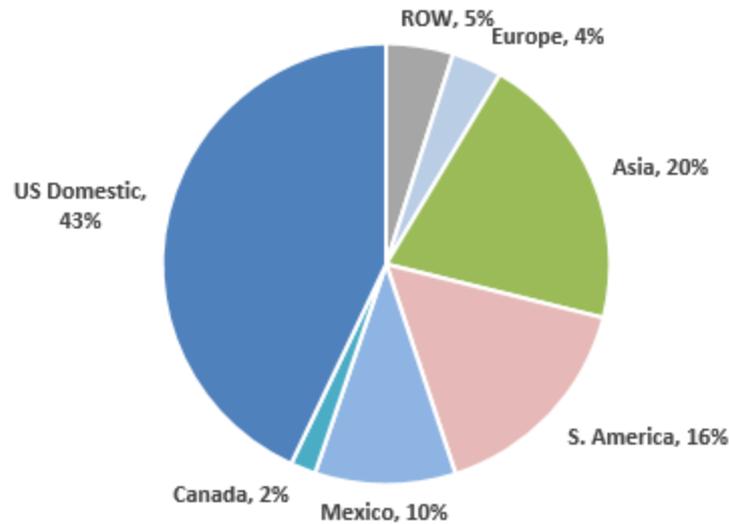
Trona

- Trona (ore that contains sodium sesquicarbonate) is a relatively rare sodium-rich mineral found in the United States, Africa, China, Turkey and Mexico.
- Chemically, Trona is a double salt
 - Sodium Carbonate + Sodium Bicarbonate + 2 Waters
 - Or symbolically: $\text{Na}_2\text{CO}_3 \bullet \text{NaHCO}_3 \bullet 2\text{H}_2\text{O}$



Continued strong demand for US soda ash in global markets. US industry running at full utilization of available capacity.

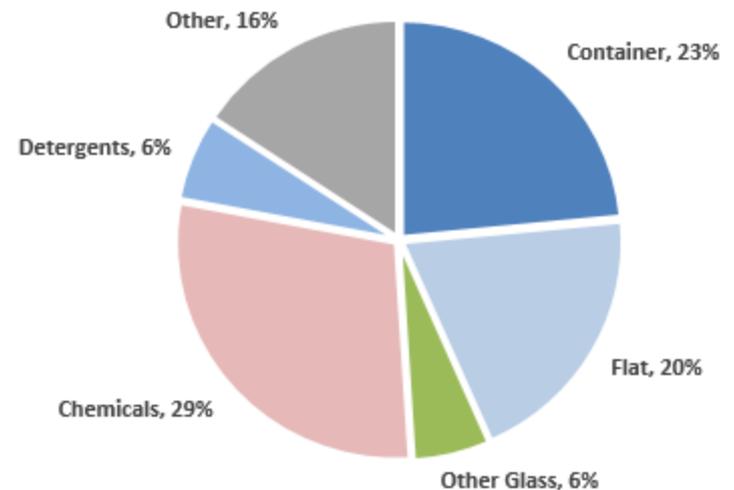
US Soda Ash Destination



*USGS, ITC data

- Full utilization of U.S. effective capacity is expected to continue in 2017.
- Exports account for >55% of demand, driving the majority of the growth

US Domestic Demand



*USGS data

- US domestic demand was ~ 5.1 m MT in 2016, expecting to grow ~1-2% in 2017.
- Demand in Flat Glass, Fiber Glass and Chemicals markets are growing with recovery of construction.
- Container glass demand flat.

Wyoming Trona Industry – Key Statistics

- Worlds largest concentration of Soda Ash facilities
 - Over 90% of the domestic Soda Ash is produced in Wyoming, over 2300 direct employees
 - Worlds largest reserves for mechanical mining
 - Wyoming Trona mines have operated for more than 60 years
 - Decades of operations remaining if we can maintain our competitive edge in a global economy
 - U.S. producers are running at full utilization due to strong global demand for natural soda ash
- Major Exporter of US Manufactured Products
 - Wyoming is the world's largest single exporter of soda ash, greater than 50% of our production is exported
 - Largest US exporter of inorganic chemicals, over \$1 billion
- Investments in Employees/Technology/Sustainability
 - Incremental expansions at Tata, Tronox in 2011
 - Tata, 7shaft installation – 2015
 - Tronox Solution Mine Pilot - 2015
 - Solvay, Boiler and Heat Exchanger Debottleneck – 2015
 - Solvay, Vent Shaft Addition - 2017
 - Ciner, Rail Yard Expansion
 - Sage grouse CCA'S and other conservation measures
 - Partnerships with Western Wyoming Community College

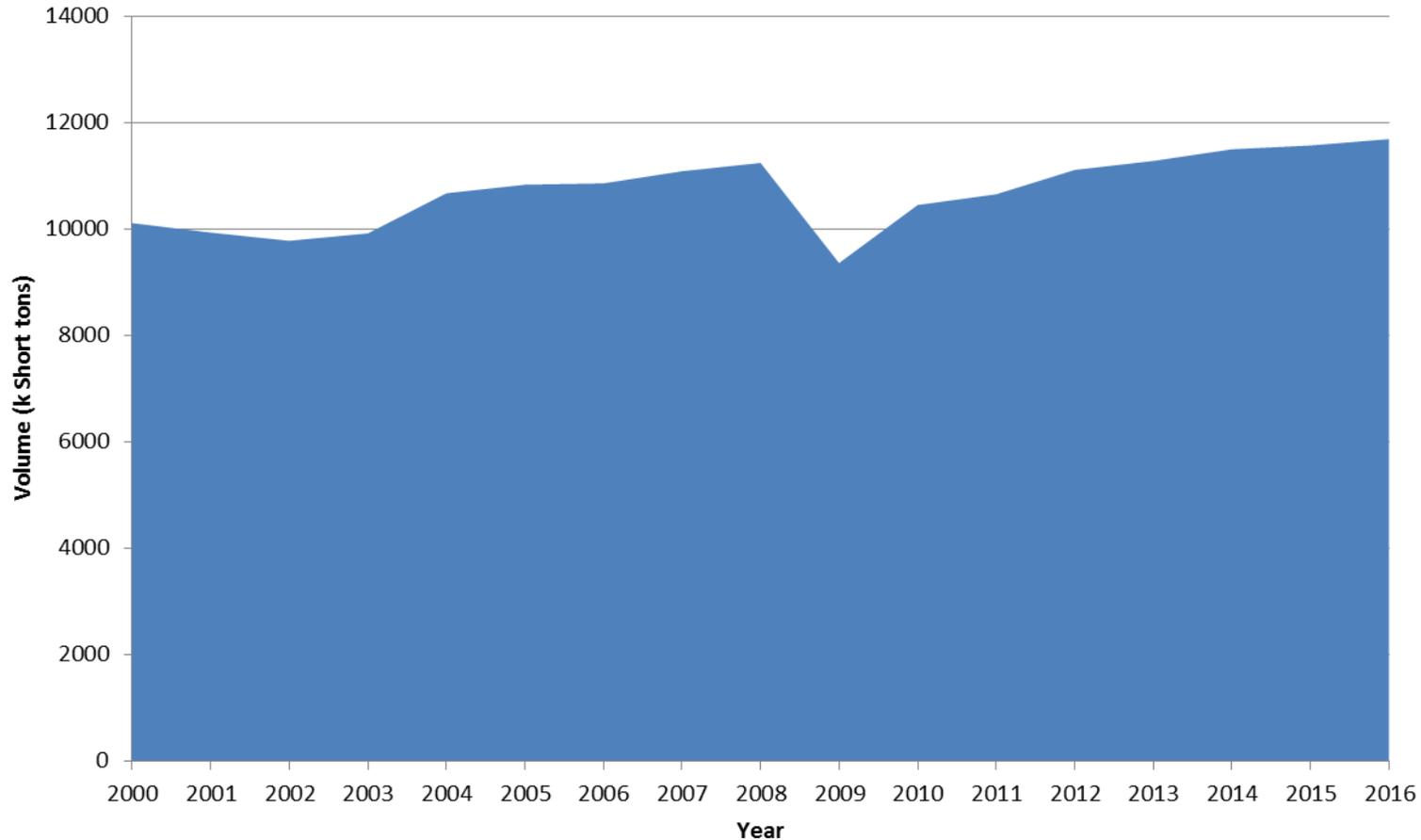
The Value of Trona to the State of Wyoming

Estimated Value in 2016

Production in tons of trona	17,507,981
Severance Tax	\$ 18,537,921
Ad Valorem Tax on Production	\$ 32,900,869
Federal Mineral Royalty (Wyoming share)	\$ 29,539,487
Ad Valorem Tax on Real and Pers. Prop.	\$ 7,761,680
State Royalties	\$ 17,416,364
Sales Tax	<u>\$ 7,178,558</u>
Total	\$ 113,334,879
Payroll Including Benefits	\$356,022,909
No. of Employees	2328
Contract Employees	264

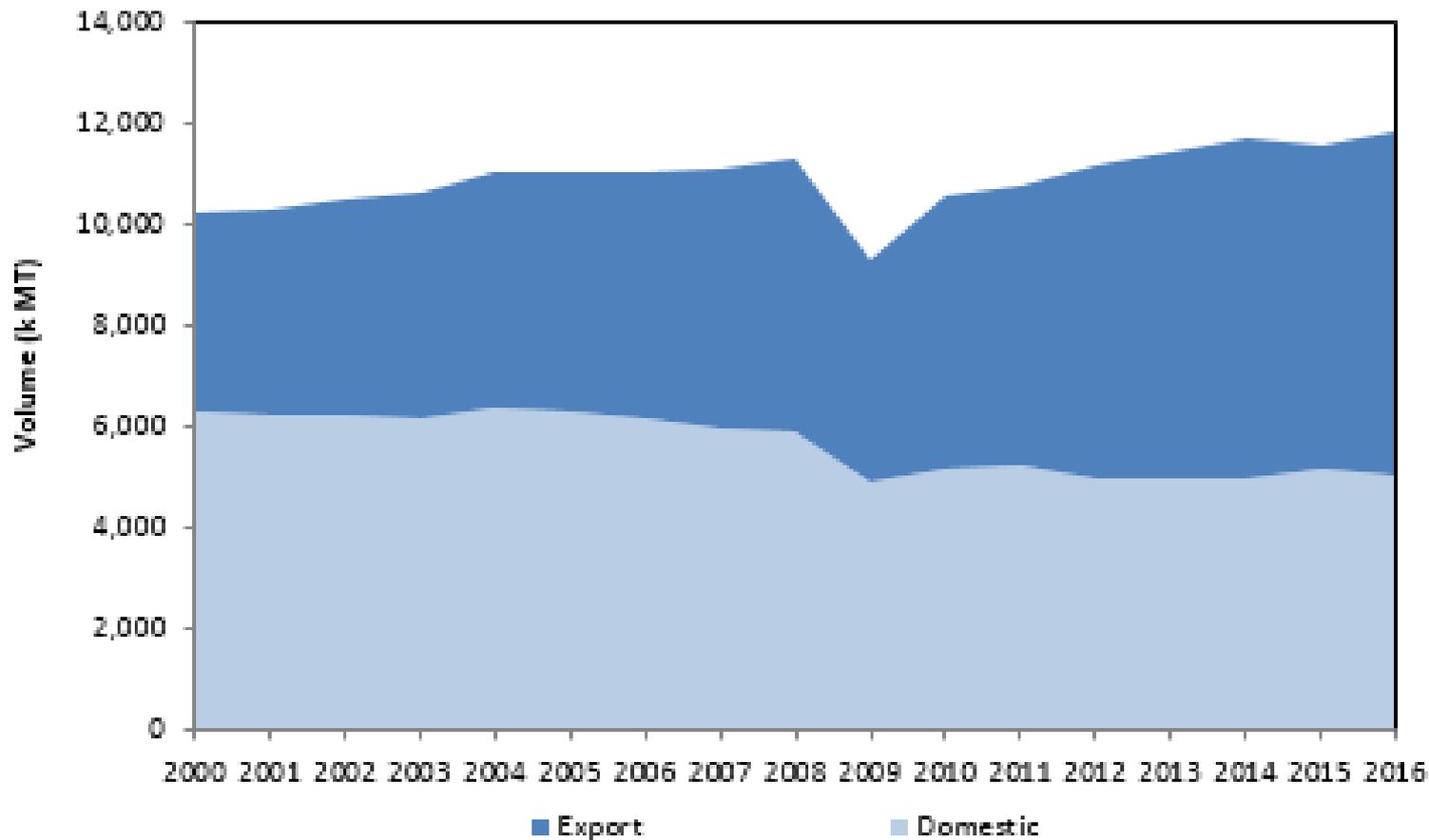
Source: Wyoming Mining Association

Wyoming Soda Ash Production 2000 - 2016



- Owners of Wyoming trona facilities have a long history of investment to insure sustainable operations and regularly expand capacity when conditions are conducive
- 15% volume growth from 2000 to 2016

US Soda Ash* Consumption 2000 – 2016



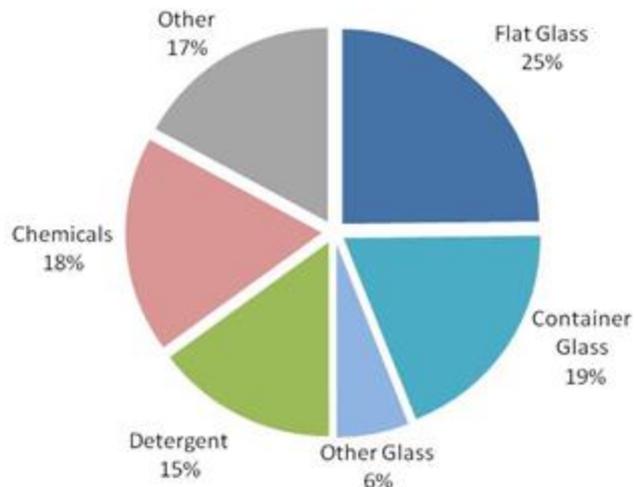
- Although global demand is growing, from 2000-2016 US domestic consumption decreased 1.4% annually
- US exports grew 3.5% annually
- The health of the Wyoming trona industry is dependent on the ability to export competitively

* Includes non-Wyoming production

Source: USGS

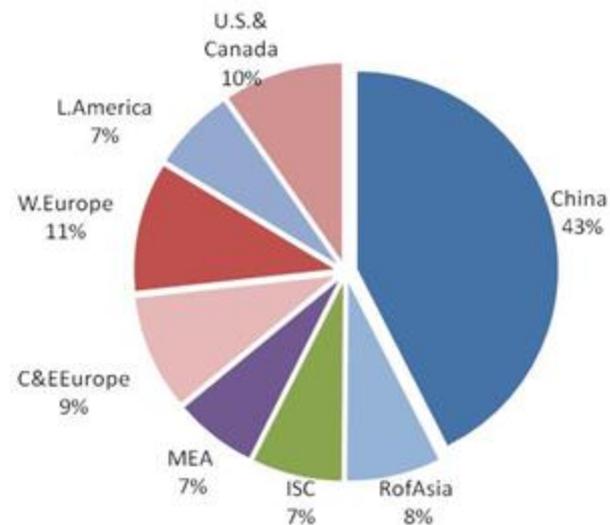
Global Soda Ash Demand Continues to Grow

Global Demand by End Use



*Other includes mining, oil & gas, flue gas desulfurization, etc;

Global Demand by Geography



MEA includes Middle East and Africa, ISC = Indian sub-continent

Sources: IHS, Tronox Estimates

TRONOX

- Global demand is estimated to grow by ~ 2% in 2017 (~ 1 million MT/yr)
- Higher growth rates are in developing economies: Latin America, Southeast Asia and Indian sub-continent

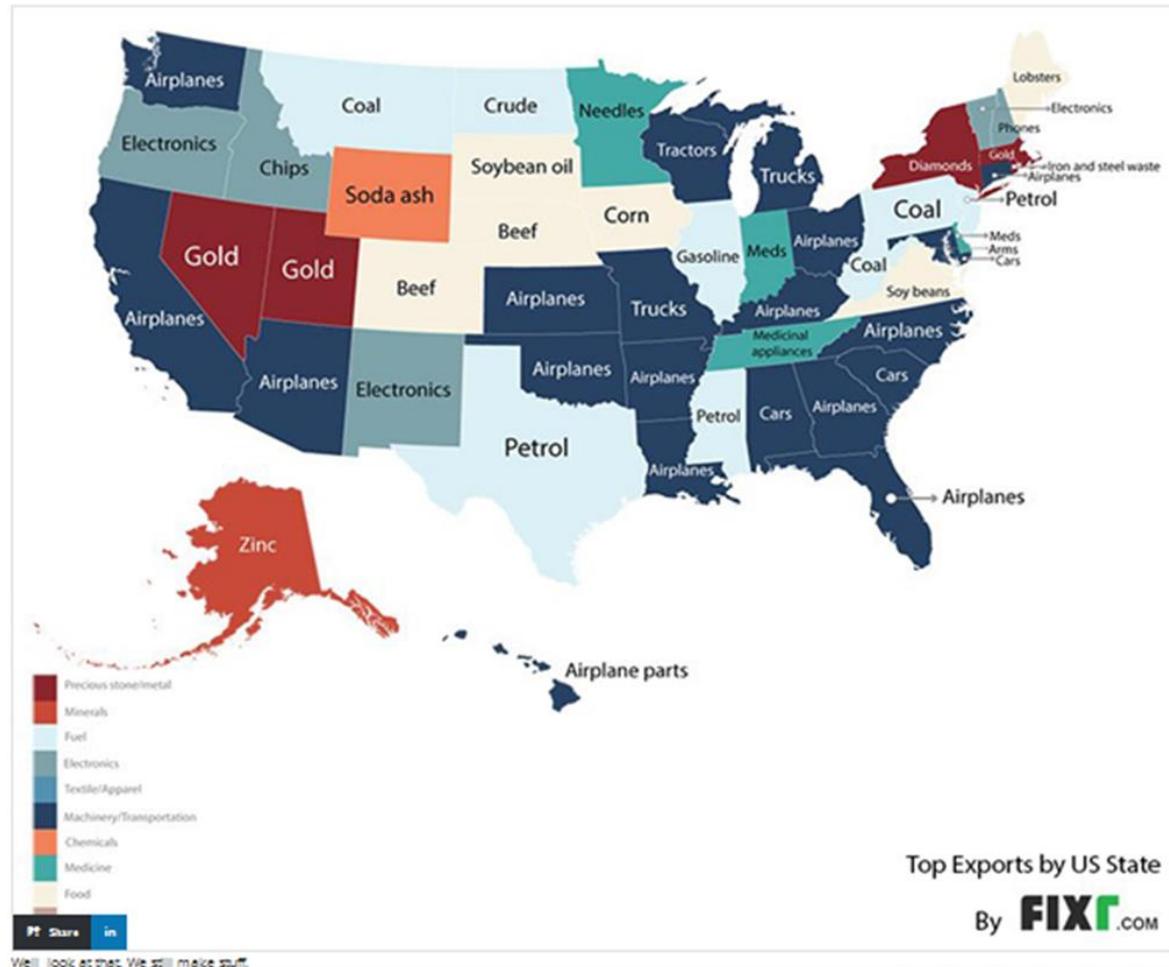
Soda Ash - One of Wyoming's Most Valuable Products

The most valuable products each state sells to the rest of the world

By Shawn Langlois
Published: May 2, 2015 2:31 p.m. ET



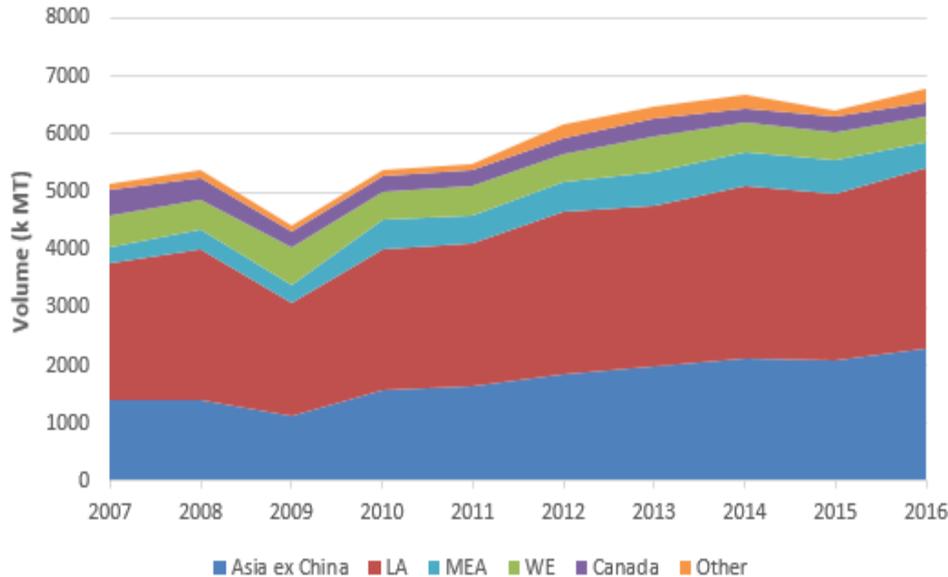
Diamonds from New York and needles from Minnesota?



Well, look at that. We still make stuff.

US Soda Ash Export Growth

Exports by Region



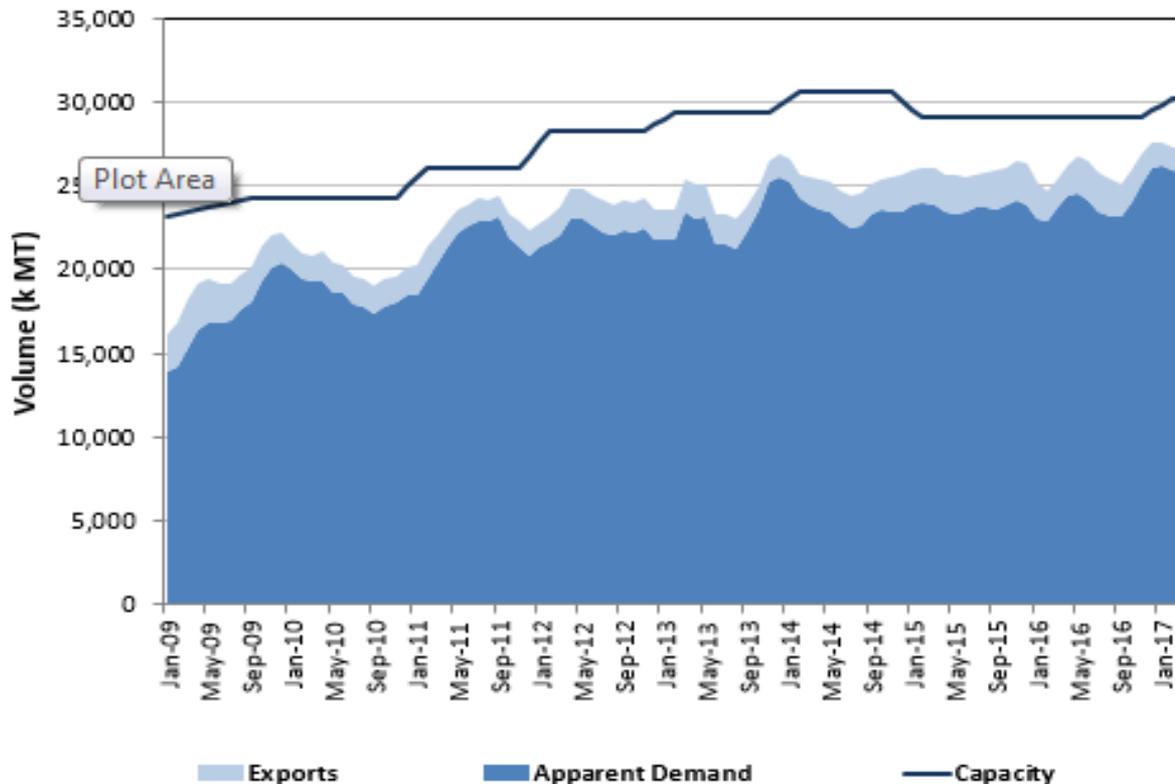
Top Countries for US Exports in 2016

Country	Exports (k MT)
Mexico	1210
Brazil	1028
Indonesia	631
Chile	359
Thailand	288
Japan	280
Korea	259
Australia	233
United Kingdom	220
Vietnam	219

- From 2007 - 2016, US exports grew annually by 3% to Latin America, 5% to Asia (excluding China), and 6% to the Middle East & Africa
- In 2016, 46% of US export volume went to Latin America, 34% to Asia, 7% to Middle East & Africa, and 6% to Western Europe

Export Competition – China Remains Oversupplied

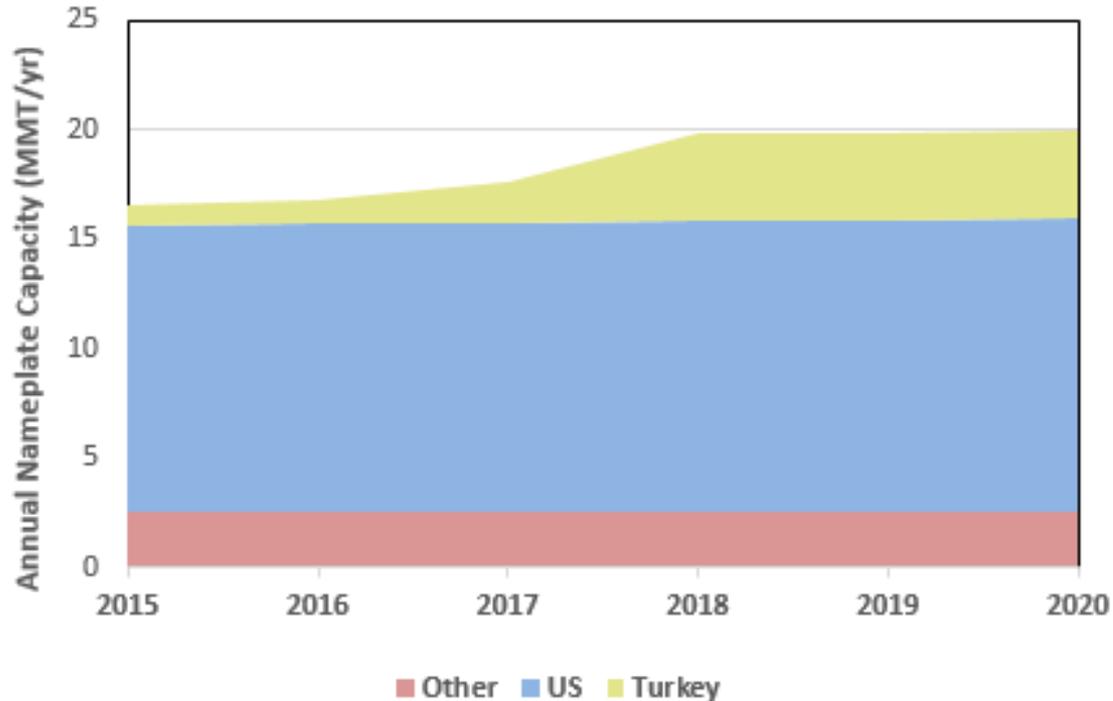
China Supply and Demand



- Chinese soda ash industry has a significant amount of excess nameplate capacity available
- Export VAT rebate (9%) remains in place as Chinese government encourages export growth
- Exports from China remain a competitive threat US exports in the Asian region

Export Competition – Turkey Expanding Natural Soda Ash Capacity

Global Natural Soda Ash Supply



- Turkey is bringing on over 3 million tons of annual capacity of Natural soda ash between 2017 and 2018.
- Low cost production from Turkey will increase competition with US natural soda ash and global synthetic producers for share of the importing regions of the world in Europe, Latin America and Southeast Asia

Trona/Soda Ash Industry - Current Concerns

- Increasing difficulty in maintaining competitiveness in the export market
 - China VAT Rebate on exports
 - Turkey capacity
 - Exchange Rates
 - Limited logistics options
 - Royalty Payments
- Uncertainty over Trade Agreements
 - NAFTA
 - Asia-Pacific without USA
- Meeting the School Funding Challenge
 - Must lessen the over-reliance on minerals
- Federal Energy Regulation and Strategy
 - Stable low cost energy critical to allow natural soda ash to be competitive against higher carbon footprint synthetic ash
- Human Resources: Attract and retain quality personnel:
 - Key positions open from 9-12+ months
 - Not only professional but also mechanics, electricians, other trades
 - Demographics driving attrition rate that is higher than recruitment and graduation rates
 - Challenging to recruit talent to small town lifestyle

Wyoming Trona Industry – Summary

- Although demand for soda ash is declining in the US, it is increasing globally with the majority of the growth in developing countries
- U.S. producers are running at full utilization due to strong global demand for natural soda ash
 - Cost
 - Carbon Footprint
- Wyoming Producers are investing to maintain their competitive advantage:
 - Technology & Sustainability
 - Capacity Expansions/ Jobs
- Wyoming, the largest natural soda ash producer in the world, remains focused on a reliable supply to the U.S. market and strategic exports for growth.



Community Contributions



Cowboys Against Cancer®
SWEETWATER COUNTY, WYOMING



LIVE UNITED



UNIVERSITY OF WYOMING



WYOMING
COMMUNITY
FOUNDATION



WYOMING
CONGRESSIONAL AWARD for YOUTH
INITIATIVE • ACHIEVEMENT • SERVICE



Back Up Slides

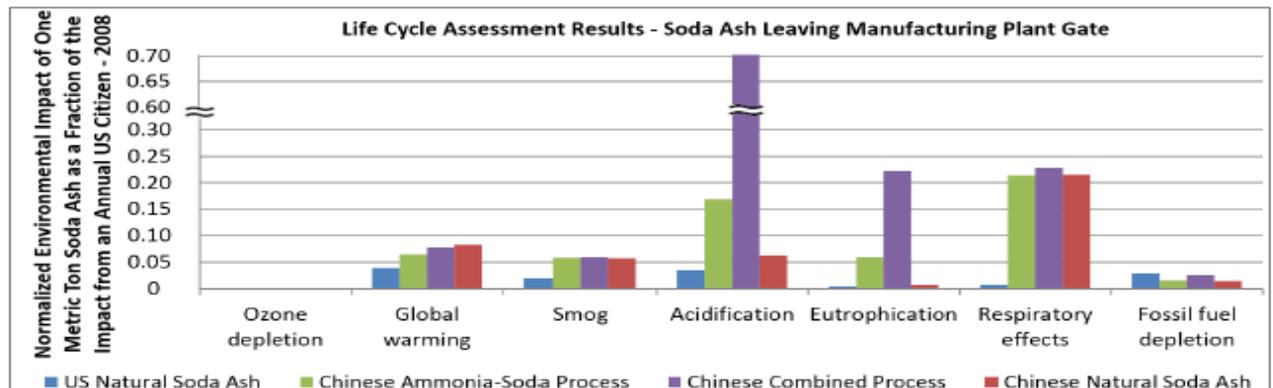
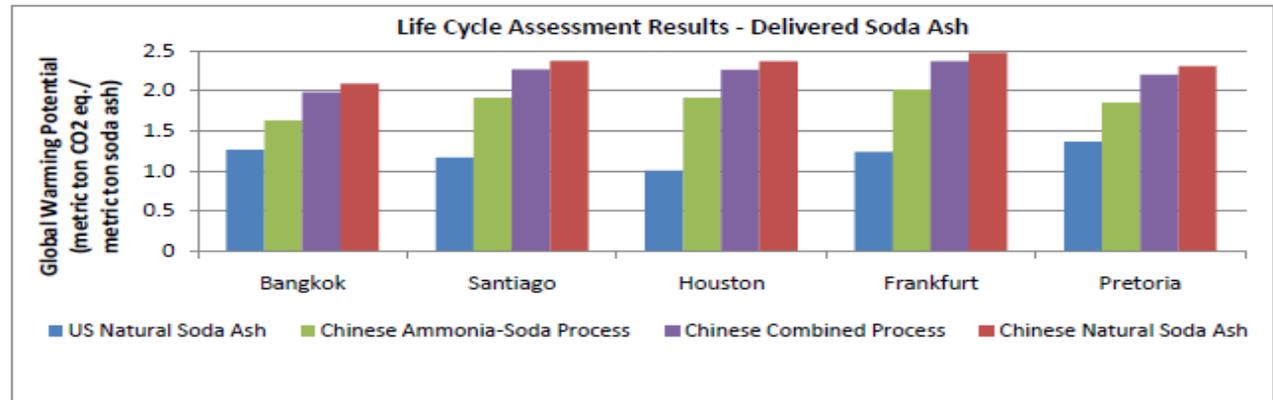
Developing economies present stronger growth potential over next 5 years

Soda Ash per Capita Consumption (kg/person)			
	2011	2016	2021
China	16.0	17.4	18.3
U.S.	16.5	16.1	16.3
W. Europe	15.5	14.8	15.1
C. Europe	11.9	12.5	13.7
CIS	12.7	11.8	13.0
Middle East	6.6	6.6	7.1
S.America	4.6	5.1	5.5
India	2.2	2.6	3.4
Africa	1.2	1.1	1.1
World	7.5	7.6	8.0

US Natural Soda Ash Life Cycle Assessment

•US Natural Soda Ash has a Greenhouse Gas (GHS) footprint 37 percent less than Chinese synthetic soda ash when leaving their respective manufacturing sites and its GHG footprint is less than Chinese synthetic soda ash even when delivered to customers around the world.

•Increased utilization of US Natural Soda Ash will mean lower greenhouse gas emissions globally and lower overall environmental impact compared to utilization of Chinese synthetic soda ash.



Source: The Industrial Minerals Association – North America (IMA-NA). The study was conducted in compliance with international standards on LCA (ISO 14040 series). The LCA study was conducted independently by Sustainable Solutions Corporation. The study is a “cradle to gate” study, examining the soda ash from its extraction as trona in an underground mine or solution mine through its processing into a final product and preparation for shipping.

Soda Ash Applications

Market Segment	Typical End Uses	End Use Value
Flat Glass	<ul style="list-style-type: none"> • windshields • residential windows • commercial construction • furniture / home furnishing 	<ul style="list-style-type: none"> • lowers glass production energy use • lowers viscosity of molten glass providing increased flexibility in molding
Container Glass	<ul style="list-style-type: none"> • beer & beverages • wine and spirits • perfume 	
Other Glass	<ul style="list-style-type: none"> • fiberglass insulation • light bulbs • tableware 	
Detergents	<ul style="list-style-type: none"> • soda ash directly in powdered detergent box (home laundry, dishwashers, institutional) 	<ul style="list-style-type: none"> • alkalinity • surfactant carrier • filler
Chemicals	<ul style="list-style-type: none"> • sodium silicates • sodium phosphates • sodium bicarbonate 	<ul style="list-style-type: none"> • sodium source
Other	<ul style="list-style-type: none"> • mining • water treatment • flue gas desulfurization • oil and gas 	<ul style="list-style-type: none"> • alkalinity

Sources: Industry information