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## Albemarle Corp ALB

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### Higher EV adoption should drive strong profit growth for Albemarle's low-cost lithium operations.



by  
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**Analyst Note** 10/08/2018

On Oct. 8, the Intergovernmental Panel on Climate Change released a report that calls for faster electric vehicle and hybrid adoption as part of the actions needed to limit the effects of climate change. The report calls for emissions to be reduced 45% versus 2010 levels by 2030. The report will be a key topic at the Katowice Climate Change Conference in December, where governments from around the world will review

the Paris agreement. We think the report's conclusions could lead to governments setting stricter regulations and investing in EV charging infrastructure that would result in increased EV adoption.

We continue to see regulation as the driving force behind medium-term EV adoption. Regions with EV-specific regulations and incentives will provide a stronger push for EV adoption. China will continue to make the strongest regulatory push to increase adoption. Tightening fuel standards in the European Union will push automakers toward electrification over the next decade, while fragmented U.S. policies that vary between the state and federal levels will have a mixed impact.

Over the long term, EV adoption will take off where regions combine abundant charging infrastructure with strong regulation. In China and the EU, we forecast EV adoption to reach 25% and 20%, respectively, of annual new light-vehicle sales by 2028. In the United States, where charging infrastructure will be less developed and regulations less stringent, we think EV adoption will lag, reaching only 12.5% by 2028. Using a regional buildup, we forecast that EVs will make up 15% of global auto sales in 2028, above the consensus forecast for 11%. We forecast hybrids to make up 21% of global auto sales in 2028, which would make EVs and hybrids 36% of total vehicles. Our top picks to invest in growing EV adoption include Albemarle, BMW, BorgWarner, Edison International, General Motors, and SQM.

#### Business Strategy and Outlook 09/21/2018

Albemarle became the world's largest lithium producer following the January 2015 acquisition of Rockwood. It effectively controls around one third of the lithium carbonate market through its own salt brine assets in Chile and a 49% joint-venture interest in the Talison mine in Australia. Albemarle's Chilean assets are among the world's lowest-cost sources of lithium. Talison is one of the best spodumene resources in the world, which allows Albemarle to be one of the lowest-cost lithium hydroxide producers globally' as spodumene can be converted directly into hydroxide.

As electric vehicle adoption increases, we expect mid-double-digit annual growth for global lithium demand, one of the best growth profiles among commodities. We anticipate that Albemarle and its Talison joint venture will be able to fulfill a sizable portion of incremental demand, as Albemarle is investing in major capacity expansions at both of its lithium production locations. Albemarle is looking to expand

#### Morningstar's Take ALB

Analyst		
<b>Price</b> 10-10-2018 95.89 USD	<b>Fair Value Estimate</b> 135 USD	<b>Uncertainty</b> High
<b>Consider Buy</b> 81 USD	<b>Consider Sell</b> 209.25 USD	<b>Economic Moat</b> Narrow
<b>Stewardship Rating</b> Exemplary		

#### Bulls Say

- Albemarle has top-tier lithium assets through its brine operations in Chile and spodumene operations in Western Australia, which are among the lowest-cost globally.
- The company has tremendous upside to electric vehicle growth through lithium batteries. Its Talison joint venture is one of the few large operations that can significantly ramp up production over the next few years to meet incremental demand.
- Albemarle also has low-cost bromine production through its highly concentrated brines in the Dead Sea and Arkansas.

#### Bears Say

- Albemarle's core bromine business has suffered from weaker demand for flame retardants, its primary end market, as consumers shift from televisions, desktops, and laptops to less-bromine-intensive tablets and mobile phones.
- A volume-over-price strategy by SQM will cause lithium prices to fall over the long term.
- The decline in oil prices has led some oil refiners to hold off on replacing their hydroprocessing catalysts, which need to be placed once every one to three years.

#### Competitors ALB

More...

Name	Price	% Chg	TTM Sales \$ mil
<b>Albemarle Corp</b>	<b>\$95.89</b>	<b>-1.42</b>	<b>3,288</b>
LyondellBasell Industries NV	\$98.33	-1.34	37,624
Sherwin-Williams Co	\$418.64	-1.42	17,225
PPG Industries Inc	\$99.37	0.82	15,372
Ecolab Inc	\$151.88	-1.99	14,376
Praxair Inc	\$159.45	-1.09	11,935

its Chilean brine lithium production capacity from 27,000 metric tons in 2016 to over 140,000 metric tons over the next decade. Furthermore, the company's Talison joint venture will triple its spodumene capacity from 80,000 metric tons to 250,000 metric tons on an LCE basis. Albemarle will continue to receive roughly half of Talison's production and is building a 100,000 metric ton lithium hydroxide plant in Australia to convert the spodumene.

Albemarle is the world's second-largest producer of bromine, a chemical used primarily in flame retardants for electronics. Bromine prices have recently stabilized as increased demand for use in servers and automobile electronics is offset by a decline in demand from TVs, desktops, and laptops, as well as lower demand for bromine used in oil field completion fluids. Despite a fairly tepid demand outlook, we expect Albemarle to generate healthy profits from bromine due to its low-cost position in the Dead Sea.

Albemarle is also a top producer of catalysts used in oil refining and petrochemicals production. These chemicals are highly tailored to specific refineries and most need to be constantly replaced, giving the company a steady stream of cash flows.

### **Economic Moat** 09/21/2018

Cost advantage and switching costs form the basis of Albemarle's narrow economic moat. Albemarle possesses the lowest-cost sources of lithium and bromine production. The company also benefits from switching costs in its catalyst business, where refiners and petrochemical producers tend to stick with existing catalysts tailored to their facilities in order to maximize product yields.

Globally, lithium is produced from either lower-cost evaporation of brine or higher-cost mining of spodumene minerals. Albemarle has a cost advantage in lithium carbonate production due to its lucrative brine assets in the Salar de Atacama in Chile, which make up approximately 80% of its lithium profits. Two factors make the Salar de Atacama the lowest-cost source of lithium in the world: dry conditions and high lithium concentration. The Salar de Atacama is one of the driest places in the world and the largest salt flat in Chile. It has an extremely high evaporation rate and low rainfall. Snow from the Andes Mountains melts and flows underground into pools of brine, which have the highest concentration of lithium globally. This high concentration makes the company one of the lowest-cost lithium producers even among brine-based producers. The company pumps the brine above ground into a network of large evaporation ponds. Water evaporates from the ponds over the course of approximately 18 months, leaving behind concentrated lithium brine, which is then processed into lithium derivatives, including lithium carbonate and lithium hydroxide for batteries. Albemarle has a long-term contract through 2043 with the Chilean government to extract over 80,000 metric tons of lithium per year. Albemarle also has lithium brine assets in Silver Peak, Nevada. While not as advantaged as the prime Chilean asset due to lower lithium concentration, this Nevada asset still sits on the lower half of the lithium cost curve.

Albemarle also owns a 49% joint-venture interest in Talison's operations in Greenbushes, Western Australia. The Talison mine produces spodumene, a mineral extracted through traditional mining methods, that is then converted into a downstream lithium product. Traditionally, spodumene-based production has set the marginal cost for lithium carbonate, and we do not view Talison as moatworthy in lithium carbonate production.

However, lithium hydroxide can be produced directly from spodumene, whereas brine-based operations must first produce carbonate and then convert to hydroxide. Although lithium hydroxide has traditionally made up a small portion of total lithium demand, electric vehicle batteries will increasingly use lithium hydroxide as hydroxide-based battery chemistries generally allow electric vehicles to have a greater range than lithium carbonate.

The ability to directly produce hydroxide from spodumene makes low-cost spodumene producers the lowest-cost lithium hydroxide producers globally. The Talison operation is one of the highest-quality spodumene deposits and sits on the low end of the lithium hydroxide cost curve, owing to its geological advantage.

Talison's spodumene has roughly double the lithium concentration of most other spodumene production, and we view the operation as moatworthy based on Albemarle's cost-advantaged lithium hydroxide production. While Talison and the downstream lithium hydroxide conversion facilities currently make up just 20% of lithium profits, large capacity expansions at Talison and Albemarle's downstream spodumene conversion operations will increase this number to roughly 45% by 2025.

Albemarle's advantaged position in bromine comes from its low-cost and long-lived asset in the Dead Sea and Arkansas. Production costs are largely determined by concentration, as higher concentration mean that less water needs to be evaporated to produce bromine from brine. The Dead Sea is the lowest-cost bromine source, with concentrations of 10,000 parts per million, while Arkansas has concentrations of 5,000 parts per million. These assets have 2.5-5.0 times the concentration of the next-best reserves in India and 25-50 times the concentration of producers in China. Albemarle's Arkansas asset has more than 70 years of reserves remaining. The Dead Sea, for all intents and purposes, is an inexhaustible asset, given its enormous reserves compared with production volume. Albemarle's Dead Sea production comes from its 50% interest in Jordan Bromine, which it operates with Arab Potash Company.

The company benefits from switching costs in refining catalysts, which are tailored to specific refineries to maximize customer profits. Refiners are essentially a commodity spread business, earning profits by converting crude oil into refined end products, including gasoline and diesel. Catalysts used in fluidized catalytic cracking help refiners reduce costs by processing heavier crudes or realizing higher prices through more-refined products. Variations in regional crude oil quality and refinery specifications require Albemarle to work closely with customers to formulate customized catalysts for each refinery. These catalysts make up a small portion of a refiner's costs and are priced based on the value they contribute to customers through improving yields, quality, and output. Catalysts provide value to refiners far in excess of their cost. Albemarle, W.R. Grace, and BASF make up the majority of the FCC catalyst market. Existing catalyst providers hold the advantage of being able to tweak their catalyst over time and maintain customer relationships, as catalyst suppliers continually improve refiner economics. Because of the highly customized nature of the product, it is difficult for competitors to provide products that offer greater value than existing catalysts, particularly as they must undergo trial periods to demonstrate superior efficacy.

#### **Fair Value and Profit Drivers** 09/21/2018

Our fair value estimate is \$135 per share. Our valuation assumes a 9.7% weighted average cost of capital and values free cash flows generated beyond our 10-year explicit forecast horizon at a multiple of 12 times midcycle EBITDA. The bulk of growth will come from the lithium segment. We expect lithium carbonate prices (on a Chilean export LCE basis) will fall to \$10,00 per metric ton (in real terms) from current prices around \$12,000. New spodumene production in Western Australia will cause spodumene prices to fall, which will lower lithium producer costs for the conversion of spodumene into lithium carbonate. However, this oversupply will be short-lived. By the mid-2020s, demand will outpace supply, moving the marginal cost of production back to lower-quality spodumene conversion. Our long-term lithium carbonate price (on a Chilean export LCE basis) is \$12,000 per metric ton. We expect lithium demand to grow at a 19% annual rate from 220,000 metric tons in 2017 to 1.5 million metric tons through 2028. As lithium supply comes on line, we expect lithium hydroxide prices will fall to the price of lithium carbonate plus the cost of conversion. Albemarle's Chilean expansions and its Talison joint venture will ramp up production to help meet strong market demand growth. Albemarle's low costs should allow it to benefit tremendously from additional volume sold. We expect a combination of higher lithium prices and volumes will help Albemarle increase EBITDA by double digits annually for the next decade. Bromine will face continued weakness as consumer electronic flame retardant declines are offset by growth from industrial uses. Desktops and laptops continue to lose share to less-bromine-intensive smartphones and tablets, and bromine intensity should decline across the board with greater substitution to other chemicals such as phosphorous. The decline will be partially offset by an increase in bromine demand for brominated flame retardants in servers and automobile electronics, which are unable to use phosphate-based flame

retardants due to higher temperatures. Catalyst sales will grow at low- to mid-single-digit rates, as FCC sales grows broadly in line with transportation fuel demand and HPC sales recovers from trough levels following the collapse of oil prices. We expect HPC intensity to increase in the coming years as clean fuel standards tighten around the world for content such as sulfur and lead.

#### **Risk and Uncertainty** 09/21/2018

The biggest risk for Albemarle is a material decline in the price of lithium. Other major risks include a continued decline in bromine prices, lower catalyst demand, and project execution risk.

Lithium prices could decline if electric vehicle demand grows more slowly than expected or production takes off too quickly. Electric vehicle demand could undershoot expectations if fuel-cell or other technologies overtake lithium as the most likely power source for next-generation vehicles. Lithium production could ramp up more quickly than demand warrants if producers like Talison, Gangfeng, or Orocobre bring too much supply to the market. Further, new lithium production technologies could alter the supply curve in both carbonate and hydroxide production.

Bromine prices could fall if we see continued weakness in bromine flame-retardant, or BFR, demand. Shifts in consumer electronics purchases to less bromine-intensive smartphones and tablets over desktops and laptops would lead to lower bromine demand. This could be exacerbated by substitution of bromine with other flame-retardant material. In addition, the widespread use of flexible chips in smartphones and tablets that do not use BFRs could also accelerate a decline in bromine demand.

Lower margins of oil refiners or lower integrated oil profits could lead these companies to delay purchases of hydroprocessing catalysts, or HPC, used to remove pollutants from fuel oils. Unlike fluidized catalytic cracking catalysts that are constantly replaced because they improve refiner yields, HPCs only need to be replaced every one to three years. As margins fall, refiners tend to delay purchases of new catalysts by squeezing extra mileage out of existing catalysts or reusing older catalysts. Moreover, Albemarle must continuously develop new fluidized catalytic cracking catalysts that enhance refiner yields. If the company is unable to develop new catalysts, it could lose customers to competitors that successfully develop better products.

#### **Stewardship** 09/21/2018

We award an Exemplary stewardship rating to Albemarle. Luke Kissam has served as CEO since September 2011. He has been with the company since 2003, serving in various roles leading the manufacturing and law functions. Before joining Albemarle, Kissam worked in corporate law at Monsanto and Merisant.

Under Kissam's leadership, Albemarle has transformed its portfolio to focus on businesses where the company has a sustainable competitive advantage, while divesting multiple middling chemicals businesses. In 2014, the company made a strategic purchase to capitalize on lithium demand growth with the acquisition of Rockwood, and we think it paid a fair price for this asset. Given strong growth in lithium profits from Rockwood's Chilean assets and Talison joint venture, somewhat offset by moderate Chemetall Surface Treatment profit growth, we think the 11 times enterprise value/EBITDA multiple (14 times without synergies) that Albemarle paid was reasonable.

The subsequent sale of Chemetall Surface Treatment to BASF in June 2016 was also a good move by management to divest a business that was not high-priority relative to its lithium and catalyst segments. The company received an excellent price for the asset, as the \$3.2 billion transaction represented an enterprise value/EBITDA multiple of 14-15 times. We would value the business at just 10-11 times, given precedent transactions and trading comparables.

Furthermore, Albemarle's management is investing heavily in lithium capacity expansion, which we think will allow the company to take advantage of growing

lithium demand from increased electric vehicle adoption. At the same time, Albemarle is not investing significant capital expenditures (above maintenance) into its bromine or catalyst businesses. Instead, both the bromine and catalyst businesses are being run to generate free cash flow that is used to partially fund the lithium capacity expansions, which we view as a prudent financial decision by Albemarle.

Management's long-term compensation is based on total shareholder return over a rolling three-year period, adjusted EBITDA, and adjusted free cash flow. While this metric aligns management with shareholders over a short-term period, we would prefer compensation metrics to include return on invested capital, to incentivize management to position the business for long-term success.

## Overview

### Profile:

Albemarle is one of the world's largest lithium producers. Our outlook for robust lithium demand is predicated upon increased demand for electric vehicle batteries. Albemarle produces lithium from its salt brine deposits in Chile and the U.S. and its hard rock joint-venture mine in Australia. Albemarle is also a global leader in the production of bromine, used in flame retardants, and oil refining catalysts.

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