Gevo, Inc.
Form 10-K
March 28, 2019

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UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

WASHINGTON, DC 20549

FORM 10-K

(Mark One)

ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934
For the fiscal year ended December 31, 2018

or

TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934

FOR THE TRANSITION PERIOD FROM _____ TO _____
Commission file number: 001-35073

Gevo, Inc.

(Exact name of registrant as specified in its charter)

Delaware	**87-0747704**
(State or other jurisdiction of incorporation or organization)	(I.R.S. Employer Identification No.)

345 Inverness Drive South, Building C, Suite 310, **80112**
Englewood, CO
(Address of Principal Executive Offices) (Zip Code)
(303) 858-8358

(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Title of Each Class	Name of Each Exchange on Which Registered
Common Stock, par value $0.01 per share	**Nasdaq Capital Market**

Securities registered pursuant to Section 12(g) of the Act:

None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act. Yes No

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes No

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes No

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes No

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 of Regulation S-K (§229.405 of this chapter) is not contained herein, and will not be contained, to the best of the registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K.

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company or an emerging growth company. See the definitions of “large accelerated filer,” “accelerated filer,” “smaller reporting company,” and “emerging growth company” in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer	Accelerated filer
Non-accelerated filer	Smaller reporting company Emerging growth company

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act.

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Exchange Act). Yes No

The aggregate market value of common equity held by non-affiliates of the registrant was approximately $30.4 million as of June 29, 2018, the last trading day of the registrant’s most recently completed second fiscal quarter, based on the closing price of the common stock as reported on the Nasdaq Capital Market on June 29, 2018. Shares of common stock held by each officer, director and holder of 10% or more of the outstanding common stock have been excluded in that such persons may be deemed to be affiliates. This determination of affiliate status is not necessarily a conclusive determination for other purposes.

As of February 28, 2019, the number of outstanding shares of the registrant’s common stock, par value $0.01 per share, was 11,658,387.

DOCUMENTS INCORPORATED BY REFERENCE

Part III of this Annual Report on Form 10-K incorporates certain information by reference from the registrant’s proxy statement for the 2019 annual meeting of stockholders to be filed no later than 120 days after the end of the registrant’s fiscal year ended December 31, 2018.

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GEVO, INC.

FORM 10-K—ANNUAL REPORT

For the Fiscal Year Ended December 31, 2018

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Forward-Looking Statements

This report contains forward-looking statements within the meaning of Section 21 E of the Securities Exchange Act of 1934 (the "Exchange Act"). When used in this Annual Report on Form 10-K (this "Report"), the words "expect," "believe," "anticipate," "estimate," "intend," "plan" and similar expressions are intended to identify forward-looking statements. These statements relate to future events or our future financial or operational performance and involve known and unknown risks, uncertainties and other factors that could cause our actual results, levels of activity, performance or achievement to differ materially from those expressed or implied by these forward-looking statements. These statements reflect our current views with respect to future events and are based on assumptions and subject to risks and uncertainties. These forward-looking statements include, among other things, statements about: risks and uncertainties related to our ability to sell our products, our ability to expand or continue production of ethanol and isobutanol at our Luverne Facility (as defined below), our ability to meet our production, financial and operational guidance, our strategy to pursue low-carbon ethanol for sale into California, our ability to replace our fossil-based energy sources with renewable energy sources at the Luverne Facility, our ability and plans to construct a commercial hydrocarbon facility to produce alcohol-to-jet fuel ("ATJ"), our ability to raise additional funds to continue operations and/or expand the Luverne Facility, our ability to produce ethanol and isobutanol on a commercial level and at a profit, achievement of advances in our technology platform, the success of our retrofit production model, the availability of suitable and cost-competitive feedstocks, our ability to gain market acceptance for our products, the expected cost-competitiveness and relative performance attributes of our ethanol and isobutanol and the products derived from isobutanol, additional competition and changes in economic conditions and the future price and volatility of petroleum and products derived from petroleum. Important factors could cause actual results to differ materially from those indicated or implied by forward-looking statements such as those contained in documents we have filed with the U.S. Securities and Exchange Commission (the "SEC"), including this Report in Item 7. "Management's Discussion and Analysis of Financial Condition and Results of Operations," Item 1A. "Risk Factors" and subsequent reports on Form 10-Q. All forward-looking statements in this Report are qualified entirely by the cautionary statements included in this Report and such other filings. These risks and uncertainties or other important factors could cause actual results to differ materially from results expressed or implied by forward-looking statements contained in this Report. These forward-looking statements speak only as of the date of this Report. We undertake no intention or obligation to update or revise any forward-looking statements, whether as a result of new information, future events or otherwise, and readers should not rely on the forward-looking statements as representing the Company's views as of any date subsequent to the date of the filing of this Report.

Unless the context requires otherwise, in this Report the terms "we," "us," "our" and "Company" refer to Gevo, Inc. and its wholly-owned and indirect subsidiaries.

This Report contains estimates and other information concerning our target markets that are based on industry publications, surveys and forecasts, including those generated by SRI Consulting, a division of Access Intelligence, LLC, Chemical Market Associates, Inc., the U.S. Energy Information Association (the "EIA"), the International Energy Agency (the "IEA"), the Renewable Fuels Association, and Nexant, Inc. ("Nexant"). Certain target market sizes presented in this Report have been calculated by us (as further described below) based on such information. This information

involves a number of assumptions and limitations and you are cautioned not to give undue weight to this information. The industry in which we operate is subject to a high degree of uncertainty and risk due to a variety of factors, including those described in "Risk Factors." These and other factors could cause actual results to differ materially from those expressed in these publications, surveys and forecasts.

Reverse Stock Split

On June 1, 2018, we effected a reverse stock split of the outstanding shares of our common stock by a ratio of one-for-twenty (the "Reverse Stock Split") and our common stock began trading on the Nasdaq Capital Market on a Reverse Stock Split-basis on June 4, 2018. Unless otherwise indicated, all share amounts, per share data, share prices, exercise prices and conversion rates set forth herein have, where applicable, been adjusted retroactively to reflect the Reverse Stock Split.

Conventions that Apply to this Report

With respect to calculation of product market volumes:

- product market volumes are provided solely to show the magnitude of the potential markets for isobutanol and the products derived from it and are not intended to be projections of our actual isobutanol production or sales;
- product market volume calculations for fuels markets are based on data available for the year 2013;
- product market volume calculations for chemicals markets are based on data available for the year 2012; and
- volume data with respect to target market sizes is derived from data included in various industry publications, surveys and forecasts generated by the EIA, the IEA and Nexant.

We have converted these market sizes into volumes of isobutanol as follows:

- we calculated the size of the market for isobutanol as a gasoline blendstock and oxygenate by multiplying the world gasoline market volume by an estimated 12.5% by volume isobutanol blend ratio;
- we calculated the size of the specialty chemicals markets by substituting volumes of isobutanol equivalent to the volume of products currently used to serve these markets;

- we calculated the size of the petrochemicals and hydrocarbon fuels markets by calculating the amount of isobutanol that, if converted into the target products at theoretical yield, would be needed to fully serve these markets (in substitution for the volume of products currently used to serve these markets); and

- for consistency in measurement, where necessary, we converted all market sizes into gallons.

Conversion into gallons for the fuels markets is based upon fuel densities identified by Air BP Ltd. and the American Petroleum Institute.

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PART I

Item 1. Business.

Company Overview

We are a next generation “low-carbon” fuel company focused on the development and commercialization of renewable alternatives to petroleum-based products. Low-carbon fuels reduce the carbon intensity, or the level of greenhouse gas (“GHG”) emissions, compared to standard fossil-based fuels across their lifecycle. The most common low-carbon fuels are renewable fuels. We are focused on the development and production of mainstream fuels like jet fuel and gasoline using renewable feedstocks that have the potential to lower greenhouse gas emissions at a meaningful scale and enhance agricultural production, including food and other related products. In addition to serving the low-carbon fuel markets, we can also serve markets for the production of chemical intermediate products for solvents, plastics, and building block chemicals using our technologies.

Our proven production technologies target what we believe to be large potential markets of renewable fuels and related chemicals that can compete directly against petrochemical products depending on the price of oil and the value of carbon intensity reductions. Renewable fuels are one of the few fuel products where the value for renewable carbon has already been established, particularly in the United States and the European Union. We believe that the demand for low-carbon fuels and renewable chemicals will continue to grow in the future.

Our renewable isobutanol production technology has been proven to work in a 1.5 million gallon per year (“MGPY”) capacity production line, (~265,000 gallon fermenter scale) at our production facility in Luverne, Minnesota (the "Luverne Facility"). We have concluded that the technology works as we expected at this scale. Our technology to convert our renewable isobutanol to ATJ, isooctane, isooctene, and para-xylene (building block for polyester) has been proven at our hydrocarbons demonstration plant located at a hydrocarbons production facility located in Silsbee, Texas (the "Silsbee facility"). We currently have the capacity to produce approximately 100,000 gallons per year of hydrocarbon products at that production facility.

In addition to our isobutanol production line, our Luverne Facility has production capacity of about 20 MGPY of ethanol, 45-50 kilotons of animal feed, and 3 million pounds of corn oil.

Our technology is designed to permit (i) the modification of an existing ethanol production facility whereby equipment is added to the facility and the existing fermenters are used to produce isobutanol rather than ethanol, or (ii)

the modification of an existing ethanol facility to add fermenters and other equipment such that the facility is capable of producing both ethanol and isobutanol simultaneously "side-by-side" (collectively referred to as “Retrofit”).

Having the flexibility to switch between the production of isobutanol and ethanol, or produce both products simultaneously, should allow us to optimize asset utilization and cash flows at a facility by taking advantage of fluctuations in market conditions. Our technology is also designed to allow relatively low capital expenditure Retrofits of existing ethanol facilities, enabling a relatively rapid route to isobutanol production from the fermentation of renewable feedstocks. Alternatively, our technology can be deployed at a greenfield or brownfield site to produce isobutanol and hydrocarbons without producing ethanol.

Decarbonization

We believe that we have the technology and production platform to produce renewable fuels that reduce the emission of additional GHGs into the atmosphere as compared to the burning of fossil-based carbon fuels, and to do so profitably. Low-carbon fuels can best be produced by (i) replacing fossil-based carbon with renewable carbon, and (ii) replacing some or most of the fossil-based energy sources needed for heat and electricity during the fuel production process. Renewable carbon comes from growing plants and crops. Growing plants efficiently provides the opportunity to capture carbon in the soil and generate protein, further lowering the carbon intensity of fuels produced from these renewable feedstocks. Eliminating or reducing fossil-based carbon is referred to as “decarbonization,” and the products resulting from such a decarbonization process are rewarded with a lower carbon intensity score, which increases the market value of certain products. In addition to the U.S. Renewable Fuel Standard (“RFS”) policy that rewards low-carbon fuels, certain markets in North America such as California, Oregon, Washington and Canada and countries such as Japan, China, India, and other Asian countries either already have or are adopting statutes and regulations that ascribe economic value to decarbonization. In Europe, the European Parliament has adopted the Renewable Energy Directive to promote the use of energy from renewable sources. We believe that decarbonization is an emerging market opportunity, and that we have the technologies, products and a base production facility to take advantage of this opportunity.

The State of California is a leader in the push for decarbonization with its Low Carbon Fuel Standard (“LCFS”), which is a market-based cap and trade approach to lowering the GHG emissions from petroleum-based transportation fuels. We believe that the LCFS approach to reducing GHGs will be implemented by Canada and other states in the United States and eventually could be implemented at the Federal level, which should create more demand for low-carbon fuel products. The demand and value for low-carbon fuel products in California has sharpened our focus on low carbon intensity ethanol. Our current production facility is small enough and specialized enough so that, with certain process optimizations, we could reduce our demand for fossil-based energy required in the production process. By doing this, we would increase the value of our ethanol because it would carry a lower carbon intensity score, which should translate into increased revenues for us as a result of the credits associated with our renewable fuels under LCFS and/or RFS. Certain improvements we make to produce low-carbon ethanol, are also expected to benefit any other low-carbon products we produce, such as our renewable isobutanol, jet fuel and isooctane (gasoline).

Low-Carbon Ethanol Opportunity

The Luverne Facility has the capability, with certain capital improvements, to produce low-carbon ethanol side-by-side with low-carbon isobutanol, in addition to renewable jet fuel and isooctane and other related products that can be made from isobutanol. By focusing on low-carbon ethanol in the near term, debottlenecking production, while adapting and optimizing the Luverne Facility's energy and equipment infrastructure to reduce the reliance on fossil-based energy sources, we believe we can increase revenues. In order to accomplish this, we may undertake further capital investments to improve our Luverne Facility, including but not limited to: (i) improvements at the Luverne Facility to further lower the carbon intensity score of our fuel products; (ii) adding wind power to provide a portion of the electricity needed for biofuel production; (iii) adding renewable natural gas to provide a portion of the natural gas needed for biofuel production; and (iv) installing fractionation technologies at the Luverne Facility to produce value added protein feed products, food grade corn oil, as well as products using the fiber fraction of corn. Concurrently, while focusing on low-carbon ethanol, subject to securing adequate financing, we plan to expand our hydrocarbon production capabilities by constructing a new larger production facility at the Luverne Facility for specialty hydrocarbon fuels (ATJ and isooctane).

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The future improvements that we are planning for the Luverne Facility will lower the carbon intensity of the Luverne Facility and should benefit both ethanol and isobutanol production. The smaller size of our Luverne Facility compared to other ethanol production facilities means that the Luverne Facility offers opportunities to lower carbon intensity that other larger scale plants might not possess. For example, we could install small cogeneration units or make certain changes to unit operations to improve water removal efficiency given the lower power demands for steam and electricity which would result in lower ongoing capital expenditures. We believe that smaller, specialized biofuel production facilities aimed at low-carbon specialty fuels, related specialty protein products, and food oils, will have an advantage over large scale ethanol plants that, out of necessity, have to focus on commodity products for industrial markets. In other words, as these low carbon intensity markets further develop, tracking carbon lifecycles will be important. Tracking carbon means knowing the supply of feedstock and how it is grown. We believe a smaller production facility like our Luverne Facility will be well positioned to source sustainably grown feedstocks.

Our Strategy

Our strategy to grow our business is to become profitable by investing capital to upgrade and “decarbonize” the Luverne Facility to primarily produce low-carbon ethanol for the California market. We plan to use low-carbon ethanol to achieve positive cash flows, which should provide us the time to execute on our ultimate business goal of producing and selling isobutanol and its derivative hydrocarbon products such as ATJ and isooctane. Key elements of our strategy include:

- ***Undertake process improvements to lower energy consumption and implement lower-carbon process energy options at the Luverne Facility.*** By investing additional capital to “decarbonize” the Luverne Facility, we believe that we can lower the carbon intensity score (i.e. lower the carbon dioxide emissions from the plant) creating additional profit margin opportunities in low-carbon markets such as California under LCFS and in Europe under the Renewable Energy Directive for our ethanol, as well as for our isobutanol and derivative hydrocarbon products produced from isobutanol.

- ***Implement fractionation technology at the Luverne Facility.*** We have chosen an innovative corn fractionation technology to deploy at the Luverne Facility in order to generate additional revenue from incremental volumes of alcohol, distiller grains and corn oil, as well as generate new revenue opportunities from the production and sale of corn fiber-based feed products.

- ***Enter into supply agreements for isobutanol and its derivative hydrocarbon products with customers to support capacity growth using project financing or other less expensive and less dilutive forms of capital.*** We intend to build on our existing customer contracts, such as our isooctane supply agreements with HCS Group GmbH ("HCS"), to obtain additional binding off-take agreements that would economically support converting the Luverne Facility primarily to the production of isobutanol and its derivative hydrocarbon products. If we are able to obtain sufficient new supply agreements, we expect to be able to raise capital to fund such conversion of the Luverne Facility using project financing or other less expensive and less dilutive forms of capital as compared to the equity offerings that we are conducting hereby and have used in the past.

Implement a hydrocarbon production unit in the next two years. Subject to receipt of financing, and pending detailed engineering, we plan to implement a hydrocarbon production unit that would have a capacity up to ten times our current production capacity for renewable hydrocarbons, or 1 MGPY. Doing this would allow us to meet the growing market demand for isooctane and jet fuel more timely and cost effective than a large commercial plant. This 1 MGPY hydrocarbon capability could be built at our existing Luverne facility where we have the capability to produce isobutanol. In addition to adding this 1 MGPY hydrocarbon unit, we expect to install equipment to enable lower production cost for isobutanol and profitably produce the 1 MGPY hydrocarbons. We expect products from this capability would be sold to our existing customer base and enable us to serve new customers and markets.

- ***Subject to receipt of financing, we plan to scale up the Luverne Facility for the production of isobutanol and its derivative products.*** Upon, and subject to, securing adequate financing agreements and binding supply agreements, we plan to build out the Luverne Facility to enable the production of isobutanol and its derivative products at levels sufficient to supply our initial larger scale off-take agreements with our customers.

- ***Expand the global production capacity of isobutanol and its derivative hydrocarbon products via licensing***. We have proven that the isobutanol production process works in full scale fermenter systems at the Luverne Facility, and we have also proven that our renewable isobutanol can be readily converted to hydrocarbon products at the Silsbee Facility. We intend to expand the global production of isobutanol and its derivative hydrocarbon products beyond the Luverne Facility through a low-cost, high-margin licensing model, in collaboration with partners such as Praj Industries, with whom we have previously announced a joint development agreement.

Markets

Ethanol Markets

The primary applications for fuel-grade ethanol in the United States include:

- *Octane enhancer*. On average, regular unleaded gasoline has an octane rating of 87 and premium unleaded gasoline has an octane rating of 91. In contrast, pure ethanol has an average octane rating of 113. Adding ethanol to gasoline enables refiners to produce greater quantities of lower octane blend stock with an octane rating of less than 87 before blending. In addition, ethanol is commonly added to finished regular grade gasoline as a means of producing higher octane mid-grade and premium gasoline.

- *Fuel blending*. In addition to its performance and environmental benefits, ethanol is used to extend fuel supplies. In light of the need for transportation fuel in the United States, the United States is increasingly seeking domestic sources of fuel. Much of the ethanol blending throughout the United States is done for the purpose of extending the volume of fuel sold at the gasoline pump.

- *Renewable fuels*. Ethanol is blended with gasoline to enable gasoline refiners to comply with a variety of governmental programs, in particular, RFS, which was enacted to promote alternatives to fossil fuels.

According to the Renewable Fuels Association, the domestic ethanol industry produced a record 15.8 billion gallons of ethanol in 2017. We believe that the ethanol market in California alone represented approximately 10% of the

national market. However, the Western United States has relatively few ethanol facilities and local ethanol production levels are substantially below the local demand for ethanol. The balance of ethanol is shipped via rail from the Midwest to the Western United States.

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We believe that approximately 90% of the ethanol produced in the United States is made in the Midwest from corn. According to the Department of Energy, or DOE, ethanol is generally blended at a rate of 10% by volume, but is also blended at a rate of up to 85% by volume for vehicles designed to operate on 85% ethanol. The EPA has increased the allowable blend of ethanol in gasoline from 10% by volume to 15% by volume for model year 2001 and newer automobiles, pending final approvals by certain state regulatory authorities. Some retailers have begun blending at higher rates in states that have approved higher blend rates.

Compared to gasoline, ethanol is generally considered to be cleaner burning and contains higher octane. We anticipate that the increasing demand for renewable transportation fuels coupled with limited opportunities for gasoline refinery expansions and the growing importance of reducing CO2 emissions through the use of renewable fuels will generate additional growth in the demand for ethanol.

According to the DOE, total annual gasoline consumption in the United States is approximately 143 billion gallons and total annual ethanol consumption represented approximately 10% of this amount in 2017. The domestic ethanol industry has substantially reached this 10% blend ratio, and we believe the industry has significant potential for growth in the event the industry can migrate to an up to 15% blend ratio, which would translate into an annual demand of up to 20 billion gallons of ethanol.

Isobutanol Direct Use Markets

Without modification, isobutanol has applications in the specialty chemical and gasoline blendstock markets. Since our potential customers in these markets would not be required to develop any additional infrastructure to use our isobutanol, we believe that selling into these markets should result in a relatively low risk profile and produce attractive margins.

Gasoline Blendstocks

- Isobutanol has direct applications as a gasoline blendstock. Fuel-grade isobutanol may be used as a high energy content, low Reid Vapor Pressure (“RVP”), gasoline blendstock and oxygenate. Based on isobutanol’s low water solubility, in contrast with ethanol, we believe that isobutanol will be compatible with existing refinery infrastructure, allowing for blending at the refinery rather than blending at the terminal.

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Further, based on isobutanol's high energy content and low water solubility, as well as testing completed by the National Marine Manufacturers Association, the Outdoor Power Equipment Institute and Briggs & Stratton, we believe that isobutanol has direct applications as a blendstock in high value specialty fuels markets serving marine, off-road vehicles, small engine and sports vehicle markets.

- We estimate the total addressable worldwide market for isobutanol as a gasoline blendstock to be approximately 43 billion gallons per year ("BGPY").

- The market size for ethanol free (E0) gasoline, a large niche, is estimated by the EIA to be about 5 BGPY, outside of reformulated gasoline ("RFG") regions. RFG areas are required to sell gasoline containing an oxygenate. Up to this point, ethanol was the only gasoline oxygenate available. We believe our isobutanol enables ethanol free gasoline in RFG areas, a market estimated to be about 2 BGPY. When RFG regions are included in the total US market size estimation, the total ethanol free market is expected to be about 7 BGPY.

Specialty Chemicals

- Isobutanol has direct applications as a specialty chemical. High-purity and chemical-grade isobutanol can be used as a solvent and chemical intermediate. We plan to produce high-purity and chemical-grade isobutanol that can be used in the existing butanol markets as a cost-effective, environmentally sensitive alternative to petroleum-based products.

- We believe that our production route will be cost-efficient and will allow for significant expansion of the historical isobutanol markets within existing butanol markets through displacing n-butanol, a related compound to isobutanol that is currently sold into butanol markets.

- We estimate the total addressable worldwide market for isobutanol as a specialty chemical to be approximately 1.2 BGPY.

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Butene and Hydrocarbon Markets Derived from Isobutanol

Beyond direct use as a specialty chemical and gasoline blendstock, isobutanol can be dehydrated to produce butenes which can then be converted into other products such as para-xylene, jet fuel and many other hydrocarbon fuels and specialty blendstocks, and specialty chemicals offering substantial potential for additional demand. The conversion of isobutanol into butenes is a fundamentally important process that enables isobutanol to be used as a building block chemical in multiple markets.

Jet Fuel

- According to the International Air Transport Association (the "IATA"), the year-on-year growth for jet fuel is about 3 BGPY and is expected to continue at approximately the same growth rate for the next decade. From 2020 onward, the airline industry has pledged to hold its annual emission of fossil carbon constant after 2020. By the year 2027, IATA expects that the airline industry will have adopted penalties tied to GHG emissions. This means that the emissions from jets need to be mitigated. As part of the mitigation of fossil based GHGs, IATA expects that renewable resource based low carbon fuels will be needed. We have developed a jet fuel made from our isobutanol, commonly referred to as ATJ.

- In April 2016, ASTM International completed its process of approving a revision of ASTM D7566 (Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons) to include alcohol to jet synthetic paraffinic kerosene derived from renewable isobutanol. This allows our renewable jet fuel to be used as a blending component in standard Jet A-1 for commercial airline use in the United States and around the globe.

- We have delivered ATJ, which was used by nine airlines for Fly Green Day, sponsored by the O’Hare Fuel Committee, at Chicago O’Hare International Airport ("Chicago O'Hare"). This event is the first time renewable jet fuel has been supplied at Chicago O’Hare using the existing airport fueling infrastructure, such as pipelines, terminals and tankage.

- We have previously delivered ATJ to Alaska Airlines, which successfully flew multiple commercial flights using our fuel in 2016, including what we believed was the first commercial flight using a cellulosic jet fuel derived from wood waste.

- We have successfully delivered to the U.S. Air Force, the U.S. Army and the U.S. Navy a combined total of approximately 90,000 gallons of our ATJ. Military and commercial airlines are currently looking to form strategic alliances with biofuels companies to meet their renewable fuel needs.

- We estimate the global market for jet fuel to be approximately 89 BGPY.

Other Hydrocarbon Fuels

- Isooctane, isooctene, diesel fuel and bunker fuel may also be produced from our isobutanol. We have been producing jet fuel and isooctane for renewable gasoline at our demonstration plant located at South Hampton Resources in Silsbee, Texas since 2011. The products produced at our hydrocarbon plant are sold on a commercial basis to develop the markets. We continue to optimize the technologies and production systems, but we believe this technology is ready to scale up on a full commercial basis.

Para-xylene ("PX") and Polyethylene Terephthalate ("PET")

- Isobutanol can be used to produce PX, polyester and their derivatives, which are used in the beverage, food packaging, textile and fibers markets. PX is a key raw material in PET production.

- We estimate the global market for PET to be approximately 50 million metric tons per year, of which approximately 30% is used for plastic bottles and containers. We have demonstrated the conversion of our isobutanol into renewable PX at the demonstration plant in Silsbee, Texas. This demonstration plant produced renewable PX from October 2013 through March 2014, and, in May 2014, we shipped renewable PX to Toray Industries, Inc. under the terms of a supply agreement.

Butenes

- Traditionally butenes have been produced as co-products from the process of cracking naphtha in the production of ethylene. Historically, lower natural gas prices and reported reductions in the use of naphtha as the feedstock for the production of ethylene have resulted in a projected reduction in the volume of available butenes. This structural shift in feedstocks increases the potential market opportunity for our isobutanol in the production of butenes.

Isobutanol can be sold to isobutylene and n-butene (butenes) chemicals users for conversion into lubricants, methyl methacrylate and rubber applications.

Distillers Grains Market

Distillers grains are produced as a co-product of ethanol production and isobutanol production. Distillers grains are valuable components of feed rations primarily to dairies and beef cattle markets, both nationally and internationally. The Luverne Facility has the capability to produce distillers grains from both ethanol and isobutanol. Producing distillers grains also allows us to lower the carbon footprint of our Luverne Facility, thereby increasing demand in

California where premiums are paid for the low-carbon attributes.

Historically, the market price for distillers grains has generally tracked the value of corn. We believe that the market price of distillers grains is determined by a number of factors, including the market value of corn, soybean meal and other competitive ingredients, the performance or value of the distillers grains in a particular feed formulation and general market forces of supply and demand, including export markets for these co-products. The market price of distillers grains is also often influenced by nutritional models that calculate the feed value of distillers grains by nutritional content, as well as reliability of consistent supply.

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Our Retrofit at the Luverne Facility

In September 2010, we acquired the Luverne Facility, a 22 MGPY ethanol production facility in Luverne, Minnesota. Since 2010, we made improvements and modifications to the Luverne Facility to add isobutanol production capabilities. The Luverne Facility is currently configured to produce ethanol and isobutanol, side-by-side.

Third Party Retrofit and Construction Activities

We have commenced a licensing strategy whereby a licensee would invest the capital for the Retrofit of its own ethanol plant or for a new greenfield build out of an isobutanol-producing plant. In return, we, as the licensor, would expect to receive an up-front license fee and ongoing royalty payments from the projects, as well as other potential revenue streams such as yeast sales. This licensing strategy is expected to take some time to develop, and we cannot assure that it will be successful. The ability to license a technology is generally related to the commercial track record of the underlying technology itself. In addition, revenues from licensing our isobutanol and/or hydrocarbon technologies are expected to be directly linked to the build out of specific projects, which may take multiple years to construct.

Our Production Technology Platform

We have used tools from synthetic biology, biotechnology, chemical catalysis, and process engineering to develop a proprietary set of technologies that enable the potential of cost effective production of isobutanol and hydrocarbon fuels and chemicals. We believe the technologies to be proven to work, having made and sold products using these technologies.

We have a proprietary fermentation yeast biocatalyst that effectively produces isobutanol. The advantage of this biocatalyst is that it (i) works in large scale fermentation systems, and (ii) can operate in complex biological mixtures such as corn mash or molasses and produce a suitable clean isobutanol product. The technology is designed to use similar carbohydrate feedstocks, similar to ethanol technology. For example, carbohydrates from non-food corn, sugar cane, molasses or cellulosic sugars each could be used depending upon cost and availability. We believe that our technology has the potential to add value to existing ethanol production sites by increasing the site profitability if our technologies are deployed.

We have demonstrated that our isobutanol to hydrocarbon technologies for the production of jet fuel, isooctane, isooctene, and paraxylene appear to be viable from a technical and process point of view. These catalytic technologies

appear to be effective and scalable.

Animal feed, protein, and oil are important products produced at our Luverne Facility. Animal feed is made from the spent grain mash from isobutanol and ethanol fermentations. We market our distiller's grains to the, beef, swine and poultry industries as a high-protein, high-energy animal feed. The spent yeast from fermentation adds protein to the mix, resulting in a higher protein content than corn itself. By selling the feed, protein, and oil products, we generate additional revenues and effectively reduce the net cost of fermentation feedstock. Going forward we see opportunity to further add value to animal feed, protein, and oil products, thereby benefiting the site margin at the Luverne Facility, whether we produce isobutanol, ethanol, or both.

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Biocatalyst Overview

Our biocatalysts are microorganisms that have been designed to consume carbohydrates and produce isobutanol as a product. Our technology team developed these proprietary biocatalysts to efficiently convert fermentable sugars of all types into isobutanol by engineering isobutanol pathways into the biocatalysts. We designed our biocatalysts to equal or exceed the performance of the yeast currently used in commercial ethanol production in yield (percentage of the theoretical maximum percentage of isobutanol that can be made from a given amount of feedstock) and rate (how fast the sugar fed to the fermentation is converted to isobutanol). To achieve this, we believe that more than 100 genetic changes have been made to our yeast biocatalyst. We achieved our target fermentation performance goals at our Luverne Facility at a commercial scale. We continue to seek to improve the performance parameters of our biocatalyst with a goal of reducing projected capital and operating costs, increasing operating reliability and increasing the volume of isobutanol production.

In 2016, in a project sponsored by the United States Department of Agriculture, we used our 1 MGPY demonstration facility located at ICM, Inc.'s St. Joseph, Missouri facility to convert hydrolyzed wood feedstocks into isobutanol. The isobutanol produced was converted to jet fuel and used for flights on Alaska Airlines.

While we believe that the majority of the development work on a commercially viable isobutanol producing yeast is complete, we expect to continue to make incremental improvements targeted to its commercial performance.

Feedstocks

In the U.S., non-food corn is a commercially attractive feedstock for both ethanol and isobutanol, because it is abundant and readily available, but more importantly because this corn generates low cost carbohydrates, protein and feed and corn oil for the food chain. In other parts of the world, sugar or molasses from cane, beets, or other sugar producing crops could be used. In the future, certain types of cellulosic sugars could be used once the cost to acquire those sugars becomes cost effective. We have designed our biocatalyst platform to be capable of producing isobutanol from any fuel ethanol feedstock currently in commercial use, which we believe, in conjunction with our proprietary isobutanol separation unit, will permit us to modify any existing fuel ethanol facility to produce our products.

Our Luverne Facility is currently set up to use non-food corn as a feedstock. The starch is fermented to isobutanol and or ethanol, the fiber and protein are isolated from the process and sold as animal feed, and the corn oil is sold for industrial use.

We expect that our feedstock flexibility will allow our technology to be deployed worldwide and will enable us to offer our customers protection from the raw material cost volatility historically associated with petroleum-based products. For example, in some parts of the world, it may be that molasses is a lower cost feedstock, in others, sugar from beets or cane might be the lower cost feedstock. As cellulosic sugars become economical, we expect that these could be viable as a feedstock too.

In the future we expect feedstocks to be chosen on the collective basis of (i) cost, (ii) carbon and or sustainability footprint with associated value, (iii) positive contribution to food chain where possible, and (iv) availability of the feedstock at a practical scale.

In June 2015, Agri-Energy, LLC ("Agri-Energy"), our wholly-owned subsidiary, entered into a Price Risk Management, Origination and Merchandising Agreement, as amended as of December 21, 2017 (the “Origination Agreement”), with FCStone Merchant Services, LLC (“FCStone”) and a Grain Bin Lease Agreement with FCStone, as amended as of December 21, 2107 (the “Lease Agreement”). Pursuant to the Origination Agreement, FCStone will originate and sell to Agri-Energy, the owner of the Luverne Facility, and Agri-Energy will purchase from FCStone, the entire volume of corn grain used by the Luverne Facility in Luverne, Minnesota.

Conversion of Isobutanol into Hydrocarbons

We have demonstrated conversion of our isobutanol into a wide variety of hydrocarbon products that are currently used to produce plastics, fibers, polyester, rubber and other polymers and hydrocarbon fuels. Hydrocarbon products consist entirely of hydrogen and carbon and are currently derived almost exclusively from petroleum, natural gas and coal. Importantly, isobutanol can be dehydrated to produce butenes, which are an intermediate product in the production of hydrocarbon products with many industrial uses. The straightforward conversion of our isobutanol into butenes is a fundamentally important process that enables isobutanol to be used as a building block chemical. Much of the technology necessary to convert isobutanol into butenes and subsequently into these hydrocarbon products is commonly known and practiced in the chemicals industry today. For example, the dehydration of ethanol to ethylene, which uses a similar process and technology to the dehydration of isobutanol, is practiced commercially today to serve the ethylene market. The dehydration of isobutanol into butenes is not commercially practiced today because isobutanol produced from petroleum is not cost-competitive with other petrochemical processes for generation of butenes. We believe that our efficient fermentation technology for producing isobutanol will promote commercial isobutanol dehydration and provide us with the opportunity to access hydrocarbon markets. To assist in accessing these markets, we have developed a hydrocarbon processing demonstration plant (“Hydrocarbons Demo Plant”) near Houston, Texas, in partnership with South Hampton Resources, Inc. (“South Hampton”). The Hydrocarbon Demo Plant can process approximately 6,000 to 8,000 gallons of our isobutanol per month into a variety of renewable hydrocarbons for use as fuels and chemicals. We have been selling products from this plant since 2011.

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Our ETO Technology

We have also developed new technologies using ethanol as a feedstock for the production of hydrocarbons, renewable hydrogen, and other chemical intermediates, which we describe as our ethanol-to-olefins ("ETO") technologies. The process produces tailored mixes of isobutylene, propylene, hydrogen and acetone, which are valuable as standalone molecules, or as feedstocks to produce other chemical products and longer chain alcohols. This technology has the potential to address additional markets in the chemicals and plastics fields, such as renewable polypropylene for automobiles and packaging and renewable hydrogen for use in chemical and fuel cell markets. At this time, this technology has only been operated at a laboratory scale, but if successfully scaled up to commercial level, this technology may provide the estimated 25 BGPY global ethanol industry a broader set of end-product market and margin opportunities.

Underpinning the ETO technology is our development of proprietary mixed metal oxide catalysts that produce either propylene, isobutylene or acetone in high yields in a single processing step. One of the benefits of the technology is that we can use conventional fuel grade specification ethanol that can be sourced from a variety of feedstocks with no apparent adverse impact on end product yields. Water, which is co-fed with the ethanol, is able to be recycled resulting in a process which generates minimal waste. The ethanol and water mixture is vaporized and fed across a fixed catalyst bed resulting in a gaseous product mix consisting of the propylene, isobutylene or acetone, in addition to hydrogen and carbon dioxide, along with lesser amounts of methane and ethylene. Separation of gaseous products can be achieved via conventional process technologies and unit operations within the petroleum industry.

We have found that our ETO technology is effective at converting fusel oils into flavors, fragrances, and certain specialty chemicals. We are evaluating the business opportunities and commercial potential.

Butamax Advanced Biofuels LLC

Between 2011 and 2015, we were involved in an intellectual property dispute with Butamax Advanced Biofuels LLC ("Butamax"). We believe the dispute was satisfactorily resolved, enabling each of our companies to pursue their respective businesses.

Cross License Agreement

On August 22, 2015, we entered into a Settlement Agreement and Mutual Release (the "Settlement Agreement") with Butamax, E.I. du Pont de Nemours & Company ("DuPont") and BP Biofuels North America LLC ("BP" and, together

with Butamax and DuPont, the "Butamax Parties"), that resolves the various disputes, lawsuits and other proceedings between one or more of the Butamax Parties and us, as previously disclosed and as specifically identified in the Settlement Agreement (the "Subject Litigation"), and creates a new business relationship pursuant to which we and Butamax and we have granted rights to each other under certain patents and patent applications in accordance with the terms of a Patent Cross-License Agreement (the "License Agreement"), which was entered into by us and Butamax concurrently with the Settlement Agreement. For additional information concerning the settlement agreement, please see our Annual Report on Form 10-K for the year-ended December 31, 2015 — Item 3 Legal Proceedings.

Pursuant to the terms of the License Agreement, each party receives a non-exclusive license under certain patents and patent applications owned or licensed (and sublicensable) by the other party for the production and use of biocatalysts in the manufacture of isobutanol using certain production process technology for the separation of isobutanol, and to manufacture and sell such isobutanol in any fields relating to the production or use of isobutanol and isobutanol derivatives, subject to the customer-facing field restrictions described below. Each party also receives a non-exclusive license to perform research and development on biocatalysts for the production, recovery and use of isobutanol.

Each party may produce and sell up to 30 MGPY of isobutanol in any field on a royalty-free basis. Butamax will be the primary customer-facing seller of isobutanol in the field of fuel blending (subject to certain exceptions, the "Direct Fuel Blending" field) and we will be the primary customer-facing seller of isobutanol in the field of jet fuel for use in aviation gas turbines (the "Jet" field, also subject to certain exceptions). As such, subject to each party's right to sell up to 30 MGPYof isobutanol in any field on a royalty-free basis, other than with Butamax's written consent, we will only sell isobutanol through Butamax in the Direct Fuel Blending field subject to a royalty based on the net sales price for each gallon of isobutanol sold or transferred by us, our affiliates or sublicensees within the Direct Fuel Blending field (whether through Butamax or not) and on commercially reasonable terms to be negotiated between the parties and Butamax will only sell isobutanol through us in the Jet field subject to a royalty based on the net sales price for each gallon of isobutanol sold or transferred by Butamax, its affiliates or sublicensees within the Jet field (whether through us or not) and on commercially reasonable terms to be negotiated between the parties; provided, that each party may sell up to 15 MGPY of isobutanol in a given year directly to customers in the other party's customer-facing field on a royalty-free basis so long as the isobutanol volumes are within the permitted 30 MGPY of isobutanol sold or otherwise transferred per year in any field described above and, in certain instances, each party may then sell up to the total permitted 30 MGPY in the other party's customer-facing field on a royalty-free basis. In addition, in order to maintain its status as the primary customer-facing seller in these specific fields, each party must meet certain milestones within the first five years of the License Agreement. If such milestones are not met as determined by an arbitration panel, then a party will have the right to sell directly to customers in the other party's customer-facing field subject to the payment of certain royalties to the other party on such sales.

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In addition to the royalties discussed above for sales of isobutanol in the Direct Fuel Blending field, and subject to our right to sell up to 30 MGPY of isobutanol in any field on a royalty-free basis, we will pay to Butamax a royalty per gallon of isobutanol sold or transferred by us, our affiliates or sublicensees within the field of isobutylene (a derivative of isobutanol) applications (other than isobutylene for paraxylene, isooctane, Jet, diesel and oligomerized isobutylene applications). Likewise, in addition to the royalties discussed above for sales of isobutanol in the Jet field, and subject to Butamax's right to sell up to 30 MGPY of isobutanol in any field on a royalty-free basis, Butamax will pay to us a royalty per gallon of isobutanol sold or transferred by Butamax, its affiliates or sublicensees within the fields of marine gasoline, retail packaged fuels and paraxylene (except for gasoline blending that results in use in marine or other fuel applications). The royalties described above will be due only once for any volume of isobutanol sold or transferred under the License Agreement, and such royalties accrue when such volume of isobutanol is distributed for end use in the particular royalty-bearing field. All sales of isobutanol in other fields will be royalty-free, subject to the potential technology fee described below.

In the event that we, our affiliates or sublicensees choose to employ a certain solids separation technology for the production of isobutanol at one of their respective plants ("Solids Separation Technology"), we are granted an option to license such technology from Butamax on a non-exclusive basis subject to the payment of a one-time technology license fee based on the rated isobutanol capacity for each such plant (subject to additional fees upon expansion of such capacity). We also receive the option to obtain an engineering package from Butamax to implement the Solids Separation Technology on commercially reasonable terms to be negotiated between the parties and subject to the technology fee described above and an additional technology licensing fee for use of the Solids Separation Technology applicable to ethanol capacity as provided in such engineering package from Butamax (which capacity is not duplicative of the rated isobutanol capacity referenced above) in instances where Butamax provides an engineering package for use at a particular plant that will run isobutanol and ethanol production side-by-side using the licensed Solids Separation Technology at such plant.

The License Agreement encompasses both parties' patents for producing isobutanol, including biocatalysts and separation technologies, as well as for producing hydrocarbon products derived from isobutanol, including certain improvements and new patent applications filed within seven years of the date of the License Agreement. While the parties have cross-licensed their patents for making and using isobutanol, the parties will not share their own proprietary biocatalysts with each other. The parties may use third parties to manufacture biocatalysts on their behalf and may license their respective technology packages for the production of isobutanol to third parties, subject to certain restrictions. A third party licensee would be granted a sub-license, and would be subject to terms and conditions that are consistent with those under the License Agreement.

Under the License Agreement, the parties also agreed to certain limitations on the making or participating in a challenge of the other party's patents that are at issue in the Subject Litigation. The parties have also made certain representations, warranties and covenants to each other including, without limitation, with respect to obtaining certain consents, indebtedness, rights in the licensed patents, and relationships with certain other ethanol plant process technology providers.

The License Agreement will continue in effect until the expiration of the licensed patents, unless earlier terminated by a party as provided in the License Agreement. The parties also have certain termination rights with respect to the term of the license granted to the other party under the License Agreement upon the occurrence of, among other things, a material uncured breach by the other party. In the event that a party's license is terminated under the License Agreement, such party's sublicense agreements may be assigned to the other party, subject to certain restrictions.

The parties may not assign the License Agreement or any right or obligation thereunder without the prior written consent of the other party. However, the parties may assign the License Agreement to an affiliate or a person that acquires all of the business or assets of such party, subject to certain restrictions.

Competition

Our isobutanol is targeted for use in the following markets: direct use as a solvent and gasoline blendstock, use in the chemicals industry for producing rubber, plastics, fibers, polyester and other polymers and use in the production of hydrocarbon fuels. We face competitors in each market, some of which are limited to individual markets, and some of which will compete with us across all of our target markets. Many of our competitors have greater financial resources than we do. If we fail to raise sufficient capital for our business and strategy, we may not be able to successfully compete.

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Renewable isobutanol. We are a leader in the development of renewable isobutanol via fermentation of renewable plant biomass. While the competitive landscape in renewable isobutanol production is limited at this time, we are aware of other companies that are seeking to develop isobutanol production capabilities, including Butamax with whom we have entered into the License Agreement. See —"Butamax Advanced Biofuels LLC—Cross License Agreement".

Solvent markets. We also face competition from companies that are focused on the development of n-butanol, a related compound to isobutanol. These companies include Cathay Industrial Biotech Ltd., METabolic EXplorer S.A., Eastman Chemicals Company, and Green Biologics Ltd. We understand that these companies produce n-butanol from an acetone-butanol-ethanol ("ABE") fermentation process primarily for the small chemicals markets. ABE fermentation using a Clostridia biocatalyst has been used in industrial settings since 1919. As discussed in several academic papers analyzing the ABE process, such fermentation is handicapped in competitiveness by high energy costs due to low concentrations of butanol produced and significant volumes of water processed. It requires high capital and operating costs to support industrial scale production due to the low rates of the Clostridia fermentation, and results in a lower butanol yield because it produces ethanol and acetone as by-products. We believe our proprietary process has many significant advantages over the ABE process because of its limited requirements for new capital expenditures, its production output of only isobutanol as a primary product and its limited water usage in production. We believe these advantages will produce a lower cost isobutanol compared to n-butanol produced by ABE fermentation. N-butanol's lower octane rating compared to isobutanol gives it a lower value in the gasoline blendstock market, but n-butanol can compete directly in many solvent markets where n-butanol and isobutanol have similar performance characteristics.

Gasoline blendstocks. In the gasoline blendstock market, isobutanol competes with non-renewable alkylate and renewable ethanol. We estimate the total potential global market for isobutanol as a gasoline blendstock to be approximately 43 BGPY. Alkylate is a premium value gasoline blendstock typically derived from petroleum. However, petroleum feeds for alkylate manufacture are pressured by continued increases in the use of natural gas to generate olefins for the production of alkylate, due to the low relative cost of natural gas compared to petroleum. Isobutanol has fuel properties similar to alkylate and, as such, we expect that isobutanol could be used as a substitute for some alkylate in fuel applications. Ethanol is renewable and has a high octane rating, and although it has a high RVP, ethanol receives a one pound RVP waiver in a large portion of the U.S. gasoline market. Renewability is important in the U.S. because the Renewable Fuels Standard program mandates that a minimum volume of renewable blendstocks be used in gasoline each year. A high octane rating is important for engine performance and is a valuable characteristic because many inexpensive gasoline blendstocks have lower octane ratings. Low RVP is important because the U.S. Environmental Protection Agency ("EPA") sets maximum permissible RVP levels for gasoline. In markets where low RVP is important, isobutanol can enable refiners to meet fuel specifications at lower cost. Ethanol's vapor pressure waiver is valuable because it offsets much of the negative value of ethanol's high RVP. We believe that our isobutanol will be valued for its combination of low RVP, low water solubility, relatively high octane and renewability.

Many production and technology supply companies are working to develop ethanol production from cellulosic feedstocks, including Shell Oil Company, DuPont-Danisco Cellulosic Ethanol LLC, POET, LLC, ICM, Inc., Mascoma Corporation, Inbicon A/S, INEOS New Planet BioEnergy LLC, Archer Daniels Midland Company, BlueFire Renewables, Inc., ZeaChem Inc., Iogen Corporation, Qteros, Inc., and many smaller startup companies.

Successful commercialization by some or all of these companies will increase the supply of renewable gasoline blendstocks worldwide, potentially reducing the market size or margins available to isobutanol.

Of particular interest to us is the “ethanol free” gasoline blendstock market. This market segment is estimated by the EIA to be approximately 5 BGPY in non RFG regions. In the past, ethanol free gasoline could not be sold in RFG areas because RFG areas require oxygen in gasoline. Isobutanol can now be used in the RFG areas to make an ethanol free gasoline. The estimated potential of isobutanol blended gasoline is estimated to be about 2 BGPY. Isobutanol containing gasoline has been successfully introduced in the Houston region. It appears that isobutanol is uniquely suited to address the market for ethanol free gasoline in RFG areas. We are unaware of any other viable alternative.

Plastics, fibers, polyester, rubber and other polymers. Isobutanol can be dehydrated to produce butenes, hydrocarbon intermediates currently used in the production of plastics, fibers, polyester, rubber and other polymers. The straightforward conversion of our isobutanol into butenes is a fundamentally important process that enables isobutanol to be used as a building block chemical in multiple markets. These markets include butyl rubber, lubricants and additives derived from butenes such as isobutylene, poly methyl methacrylate from isobutanol, propylene for polypropylene from isobutylene, polyesters made via PX from isobutylene and polystyrene made via styrene.

In these markets, we compete with the renewable isobutanol companies and renewable n-butanol producers described previously, and face similar competitive challenges. Our competitive position versus petroleum-derived plastics, fibers, rubber and other polymers varies, but we believe that the high volatility of petroleum prices, often tight supply markets for petroleum-based petrochemical feedstocks and the desire of many consumers for goods made from more renewable sources will enable us to compete effectively. However, petrochemical companies may develop alternative pathways to produce petrochemical-based hydrocarbon products that may be less expensive than our isobutanol or more readily available or developed in conjunction with major petrochemical, refiner or end user companies. These products may have economic or other advantages over the plastics, fibers, polyester, rubber and other polymers developed from our isobutanol. Further, some of these companies have access to significantly more resources than we do to develop products.

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Additionally, Global Bioenergies, S.A. is pursuing the direct production of isobutylene from renewable carbohydrates. Through analysis of the fermentation pathway, we believe that the direct production of butenes such as isobutylene via fermentation will have higher capital and operating costs than production of butenes derived from our isobutanol.

Hydrocarbon fuels. Beyond direct use as a fuel additive, isobutanol can be converted into many hydrocarbon fuels and specialty blendstocks, offering substantial potential for additional demand in the fuels markets. We will compete with the incumbent petroleum-based fuels industry, as well as biofuels companies. The incumbent petroleum-based fuels industry makes the vast majority of the world's gasoline, jet and diesel fuels and blendstocks. The petroleum-based fuels industry is mature, and includes a substantial base of infrastructure for the production and distribution of petroleum-derived products. However, the industry faces challenges from its dependence on petroleum. High and volatile oil prices will provide an opportunity for renewable producers relying on biobased feedstocks like corn, which in recent years have had lower price volatility than oil, to compete.

Biofuels companies will provide substantial competition in the gasoline market. These biofuels competitors are numerous and include both large established companies and numerous startups. Government tax incentives for renewable fuel producers and regulations such as the RFS Program help provide opportunities for renewable fuels producers to compete. In particular, in the gasoline and gasoline blendstock markets, Virent Energy Systems, Inc. ("Virent") offers a competitive process for making gasoline and gasoline blendstocks. However, we have the advantage of being able to target conversion of isobutanol into specific high-value molecules such as isooctane, which can be used to make gasoline blendstocks with a higher value than whole gasoline, which we do not believe Virent's process can match. In the jet fuel market, we may face competition from companies such as Synthetic Genomics, Inc., Sapphire Energy, Inc. and Exxon-Mobil Corporation, which are pursuing production of jet fuel from algae-based technology. Renewable Energy Group, Inc. and others are also targeting production of jet fuels from vegetable oils and animal fats. Red Rock Biofuels LLC, Fulcrum BioEnergy, Inc. and others are planning to produce jet fuel from renewable biomass. In the diesel fuels market, competitors such as Amyris Biotechnologies, Inc. ("Amyris") provide alternative hydrocarbon diesel fuel. We believe our technology provides a higher yield on feedstock than the isoprenoid fermentation pathway developed by Amyris, which we believe will yield a production cost advantage.

Ethanol. We compete with numerous ethanol producers located throughout the U.S., many of which have much greater resources than we do, including Archer-Daniels-Midland Company, Green Plains, Inc., POET, LLC and Valero Energy Corporation. Competition for corn supply from other ethanol plants and other corn consumers will likely exist in all areas and regions in which our current and future plants will operate. We also face competition from foreign producers of ethanol and such competition may increase significantly in the future. Large international companies have developed, or are developing, increased foreign ethanol production capacities. Brazil is the world's second largest ethanol producing country. Brazil's ethanol production is sugarcane-based, as opposed to corn-based, and has historically been less expensive to produce.

Intellectual Property

Our success depends in large part on our proprietary products and technology for which we seek protection under patent, copyright, trademark and trade secret laws. Such protection is also maintained in part using confidential disclosure agreements. Protection of our technologies is important so that we may offer our customers and partners proprietary services and products unavailable from our competitors, and so that we may exclude our competitors from using technology that we have developed or exclusively licensed. If competitors in our industry have access to the same technology, our competitive position may be adversely affected.

We have submitted hundreds of patent applications in the U.S. and in various foreign jurisdictions. These patent applications are directed to our technologies and specific methods and products that support our business in the biofuel and bioindustrial markets. We continue to file new patent applications, for which terms extend up to 20 years from the filing date in the U.S.

We have been issued multiple patents in the U.S. and in foreign jurisdictions.

In addition to the patents and applications described above, we have a global cross-license to certain patents and applications relating to the production, recovery, and use of isobutanol that are owned or licensed by Butamax. The global cross-license allows us to freely practice the licensed inventions, subject to the terms of the cross-license. For information regarding this license, see —"Butamax Advanced Biofuels LLC—Cross License Agreement".

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We intend to file and prosecute patent applications and maintain trade secrets, as is consistent with our business plan, in an ongoing effort to protect our intellectual property. It is possible that our licensors' current patents, or patents which we may later acquire or license, may be successfully challenged or invalidated in whole or in part. It is also possible that we may not obtain issued patents from our filed applications, and may not be able to obtain patents regarding other inventions we seek to protect. We also may not file patents in each country in which we plan to do business or actually conduct business. Under appropriate circumstances, we may sometimes permit certain intellectual property to lapse or go abandoned. Due to uncertainties inherent in prosecuting patent applications, sometimes patent applications are rejected and we may subsequently abandon them. It is also possible that we will develop products or technologies that will not be patentable or that the patents of others will limit or preclude our ability to do business. In addition, any patent issued to us may provide us with little or no competitive advantage, in which case we may abandon such patent or license it to another entity.

We have obtained registered trademarks for Gevo Integrated Fermentation Technology™, GIFT™, and Gevo® in the U.S. These registered and pending U.S. trademarks are also registered or pending in certain foreign countries.

Our means of protecting our proprietary rights may not be adequate and our competitors may independently develop technology or products that are similar to or compete with ours. Patent, trademark and trade secret laws afford only limited protection for our technology platform and products. The laws of many countries do not protect our proprietary rights to as great an extent as do the laws of the U.S. Despite our efforts to protect our proprietary rights, unauthorized parties have in the past attempted, and may in the future attempt, to operate using aspects of our intellectual property or products or to obtain and use information that we regard as proprietary. Third parties may also design around our proprietary rights, which may render our protected technology and products less valuable. In addition, if any of our products or technologies is covered by third-party patents or other intellectual property rights, we could be subject to various legal actions. We cannot assure you that our technology platform and products do not infringe patents held by others or that they will not in the future.

Litigation may be necessary to enforce our intellectual property rights, to protect our trade secrets, to determine the validity and scope of the proprietary rights of others or to defend against claims of infringement, invalidity, misappropriation or other allegations. Any such litigation could result in substantial costs and diversion of our resources. We may be unable to finance litigation costs, which may harm our ability to enforce our intellectual property rights. Any settlement of or adverse judgment resulting from such litigation could require us to obtain a license to continue to make, use or sell the products or technology that is the subject of the claim, or otherwise restrict or prohibit our use of the technology.

Customers, Partnerships and Collaborations

In 2018, Eco-Energy, LLC ("Eco-Energy") accounted for approximately 72% of our consolidated revenue. In 2017 and 2016, C&N Ethanol Marketing, LLC (C&N Ethanol") accounted for approximately 76%, 71% of our consolidated

revenue, respectively. In the same years, Purina Animal Nutrition, LLC, formerly Land O'Lakes Purina Feed LLC ("Purina") accounted for approximately 21%, 17% and 17% of our consolidated revenue, respectively. Both are customers of our Gevo Development/Agri-Energy segment (see Note 18). Given the production capacity compared to the overall size of the North American market and the fungible demand for our products, we do not believe that a decline in a specific customer's purchases would have a material adverse long-term effect upon our financial results.

As of the date of the filing of this Report, we had entered into the following key arrangements:

HCS Group GmbH – In February 2019, we entered into a long-term, “take or pay” renewable isooctane purchase and sale agreement with HCS to supply renewable isooctane. We believe that this long-term, “take or pay” purchase and sale agreement with HCS is an important step forward in our previously-announced strategy to build out our advanced biofuels production facility in Luverne, Minnesota to increase the production of isobutanol and renewable jet fuel and isooctane derived from renewable isobutanol.

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Eco-Energy. In February 2018, we entered into an ethanol and isobutanol purchase and marketing agreement with Eco-Energy, which provides for the sale and marketing of ethanol and isobutanol produced at our Luverne Facility. Eco-Energy will purchase at least 90% of our ethanol production for its own use or account, or purchase such amounts of ethanol to sell and market to third parties, at market prices at the time of a purchase order for the sale of the ethanol. Agri-Energy will also pay Eco-Energy a marketing fee for any product sold to third parties under the terms of the agreement. Agri-Energy may also sell isobutanol to Eco-Energy under the terms of the agreement, however, Agri-Energy is under no obligation to sell any isobutanol to Eco-Energy.

Purina Animal Nutrition, LLC. In December 2011, we entered into a commercial iDG's™ off-take and marketing agreement with Purina for the sale of iDGs™ produced by the Luverne Facility. Purina provides farmers and ranchers with an extensive line of agricultural supplies (feed, seed, and crop protection products) and services. In February 2019, we amended and restated the agreement with Purina. Pursuant to the amended and restated agreement, Purina will be the exclusive marketer of all of our animal feed products. The amended and restated agreement has an initial three-year term with one-year renewals thereafter if the parties so agree. Further, we plan to work with Purina to explore opportunities to upgrade our animal feed products for special value-added applications in feed markets.

Research and Development

Our strategy depends on continued improvement of our technologies for the production of isobutanol, as well as next generation chemicals and biofuels based on our isobutanol technology. Accordingly, we annually devote significant funds to research and development. Our research and development activities are currently being performed primarily in our corporate headquarters located in Englewood, Colorado and the Hydrocarbons Demo Plant in Silsbee, Texas.

Government Regulation - Environmental Compliance Costs

Regulation by governmental authorities in the U.S. and other countries is a significant factor in the development, manufacture and marketing of second-generation biofuels. Our isobutanol and the next generation products isobutanol will be used to produce may require regulatory approval by governmental agencies prior to commercialization. In particular, biofuels are subject to rigorous testing and premarket approval requirements by the EPA’s Office of Transportation and Air Quality, and regulatory authorities in other countries. In the U.S., various federal, and, in some cases, state statutes and regulations also govern or impact the manufacturing, safety, storage and use of biofuels. The process of seeking required approvals and the continuing need for compliance with applicable statutes and regulations requires the expenditure of substantial resources. Regulatory approval, if and when obtained for any of the next generation products isobutanol is used to produce, may be limited in scope, which may significantly limit the uses for which our isobutanol and these next generation products may be marketed.

When built at a dry-mill facility, our GIFT™ fermentation process creates iDGs™, a potential animal feed component, as a co-product. We are currently approved to sell iDGs™ as animal feed through the self-assessed Generally Regarded as Safe ("GRAS") process of the U.S. Food and Drug Administration (the "FDA") via third party scientific review. While we believe we can rely on the GRAS process, as we update our biocatalysts to increase isobutanol production, for further customer assurance, we also intend to pursue approval upon a completed biocatalyst from the Center for Veterinary Medicine of the FDA. Even if we receive such approval, the FDA's policies may change and additional government regulations may be enacted that could prevent, delay or require regulatory approval of our co-products. We cannot predict the likelihood, nature or extent of adverse governmental regulations that might arise from future legislative or administrative action, either in the U.S. or abroad.

Our process contains a genetically engineered organism which, when used in an industrial process, is considered a new chemical under the EPA's Toxic Substances Control Act program ("TSCA"). The EPA's Biotechnology Program under TSCA requires the submission of certain information of the Office of Pollution Prevention and Toxic Substances. Due to the nature of our microorganism we can utilize the TSCA Biotechnology Program Tier I and Tier II exemption criteria at our Luverne Facility.. As we expand our business activities, we will pursue the EPA's Microbial Commercial Activity Notice process for future plants. We do not anticipate a material adverse effect on our business or financial condition as a result of our efforts to comply with these requirements. However, the TSCA new chemical submission policies may change and additional government regulations may be enacted that could prevent or delay regulatory approval of our products. We cannot predict the likelihood, nature or extent of adverse governmental regulations that might arise from future legislative or administrative action, either in the U.S. or abroad.

There are various third-party certification organizations, such as ASTM International and Underwriters' Laboratories, Inc. ("UL"), involved in certifying the transportation, dispensing and use of liquid fuel in the U.S. and internationally. In 2013, a specification for fuel grade isobutanol titled ASTM D7862 "Standard Specification for Butanol for Blending with Gasoline for Use as Automotive Spark-Ignition Engine Fuel" was published. In April 2016, ASTM International completed its process of approving the revision of ASTM D7566 (Standard Specification for Aviation Turbine Fuel Containing Synthesized Hydrocarbons) to include alcohol to jet synthetic paraffinic kerosene (ATJ-SPK) derived from renewable isobutanol. In addition, UL has published guidance on the use of isobutanol-gasoline blends in its UL87A fuel dispensers. When ATJ-SPK which meets the specifications of ASTM D7566 is blended at a level of 30% or lower with petroleum based jet fuel which meets the specifications of ASTM D1655, the entire blended product meets the specifications of ASTM D1655, conventional jet fuel. In other words, the blend containing the ATJ-SPK is completely fungible with any conventional D1655 jet fuel. Voluntary standards development organizations may change and additional requirements may be enacted that could prevent or delay marketing approval of our products. The process of seeking required approvals and the continuing need for compliance with applicable statutes and regulations require the expenditure of substantial resources. We do not anticipate a material adverse effect on our business or financial conditions as a result of our efforts to comply with these requirements, but we cannot predict the likelihood, nature or extent of adverse third-party requirements that might arise from future action, either in the U.S. or abroad.

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We are subject to various federal, state and local environmental laws and regulations, including those relating to the discharge of materials into the air, water and ground, the generation, storage, handling, use, transportation and disposal of hazardous materials and the health and safety of our employees. These laws and regulations require us to obtain environmental permits and comply with numerous environmental restrictions as we construct and operate isobutanol assets. They may require expensive pollution control equipment or operation changes to limit actual or potential impacts to the environment. A violation of these laws, regulations or permit conditions can result in substantial fines, natural resource damage, criminal sanctions, permit revocations and facility shutdowns.

There is a risk of liability for the investigation and cleanup of environmental contamination at each of the properties that we own or operate and at off-site locations where we arrange for the disposal of hazardous substances. If these substances are or have been disposed of or released at sites that undergo investigation or remediation by regulatory agencies, we may be responsible under the Comprehensive Environmental Response, Compensation and Liability Act or other environmental laws for all or part of the costs of investigation and remediation. We may also be subject to related claims by private parties alleging property damage and personal injury due to exposure to hazardous or other materials at or from the properties. Some of these matters may require us to expend significant amounts for investigation and cleanup or other costs. We are not aware of any material environmental liabilities relating to contamination at or from our facilities or at off-site locations where we have transported or arranged for the disposal of hazardous substances.

In addition, new laws, new interpretations of existing laws, increased governmental enforcement of environmental laws or other developments could require us to make significant additional expenditures. Continued government and public emphasis on environmental issues can be expected to result in increased future investments in environmental controls at our facilities which cannot be estimated at this time. Present and future environmental laws and regulations applicable to our operations, more vigorous enforcement policies and discovery of currently unknown conditions could all require us to make substantial expenditures. For example, our air emissions are subject to the Clean Air Act, the Clean Air Act Amendments of 1990 and similar state and local laws and associated regulations. Under the Clean Air Act, the EPA has promulgated National Emissions Standards for Hazardous Air Pollutants (“NESHAP”), which could apply to facilities that we own or operate if the emissions of hazardous air pollutants exceed certain thresholds. If a facility we operate is authorized to emit hazardous air pollutants above the threshold level, then we might still be required to come into compliance with another NESHAP at some future time. New or expanded facilities might be required to comply with both standards upon startup if they exceed the hazardous air pollutant threshold. In addition to costs for achieving and maintaining compliance with these laws, more stringent standards may also limit our operating flexibility.

As a condition to granting the permits necessary for operating our facilities, regulators could make demands that increase our construction and operations costs, which might force us to obtain additional financing. For example, unanticipated water discharge limits could sharply increase construction costs for our projects. Permit conditions could also restrict or limit the extent of our operations. We cannot guarantee that we will be able to obtain or comply with the terms of all necessary permits to complete the Retrofit of an ethanol plant. Failure to obtain and comply with all applicable permits and licenses could halt our construction and could subject us to future claims.

Our products benefit from the RFS Program in that our ethanol and isobutanol are currently eligible for Renewable Identification Numbers or RINS that have value based on the current RFS Program. The RFS Program could change, impacting our products, positively or negatively.

Various systems are being put in place around the workd to measure carbon intensity and reduction of GHGs, with the intent of creating a system to monetize the value of the reduction of carbon. LCFS in CA is a good example. In order to benefit from such systems, companies need to have their products qualified through a regulatory process. There is no guarantee that any benefit could be gained. Gevo has not yet attempted to gain approval for programs such as LCFS.

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Employees

As of December 31, 2018, we employed 52 employees, 21 of whom were employed by us in our principal offices located in Englewood, Colorado. Of our employees, 14 were engaged in research and development activities and 7 were engaged in general, administrative and business development activities. As of December 31, 2018, our subsidiary, Agri-Energy, employed 31 employees, all of whom were located in Luverne, Minnesota, and involved in the operations of our production facility. None of our employees are represented by a labor union, and we consider our employee relations to be good.

Corporate Information

We were incorporated in Delaware in June 2005 as a corporation under the name Methanotech, Inc. and filed an amendment to our certificate of incorporation changing our name to Gevo, Inc. on March 29, 2006. Our principal executive offices are located at 345 Inverness Drive South, Building C, Suite 310, Englewood, CO 80112, and our telephone number is (303) 858-8358.

Website Access to SEC Filings

We are subject to the reporting requirements under the Exchange Act. Consequently, we are required to file reports and information with the SEC, including reports on the following forms: Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K, and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act. These reports and other information concerning us may be accessed, free of charge, through the SEC's website at www.sec.gov and on our website at www.gevo.com. Such filings are placed on our website as soon as reasonably practical after they are filed with the SEC. Any information contained in, or that can be accessed through our website, is not incorporated by reference into, nor is it in any way part of, this Report.

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Item 1A. Risk Factors

You should carefully consider these risk factors described below before you decide to invest in our securities. The risks described below are not the only ones facing us. Our business is also subject to the risks that affect many other companies, such as competition, technological obsolescence, labor relations, general economic conditions, geopolitical changes and international operations. Additional risks and uncertainties not presently known to us or that we currently believe are immaterial may also impair our business operations and our liquidity. The risks described below could cause our actual results to differ materially from those contained in the forward-looking statements we have made in this Report, the information incorporated herein by reference and those forward-looking statements we may make from time to time.

Risks Related to our Business and Strategy

We have substantial indebtedness outstanding and may incur additional indebtedness in the future. Our indebtedness exposes us to risks that could adversely affect our business, financial condition and results of operations.

As of December 31, 2018, we had approximately $13.8 million in outstanding 12% Convertible Senior Notes, due 2020, which were issued to WB Gevo, Ltd. and its affiliates ("Whitebox") in June 2017 (the "2020 Notes"). In addition, we and any current and future subsidiaries of ours may incur substantial additional debt in the future, subject to the specified limitations in our existing financing documents and the indenture governing the 2020 Notes. If new debt is added to our or any of our subsidiaries' debt levels, the risks described in "—Risks Related to Owning Our Securities" could intensify.

Our current and future indebtedness could have significant negative consequences for our business, results of operations and financial condition, including:

- increasing our vulnerability to adverse economic and industry conditions;
- limiting our ability to obtain additional financing;
- requiring the dedication of a substantial portion of our cash flow from operations to service our indebtedness, thereby reducing the amount of our cash flow available for other purposes;
- limiting our flexibility in planning for, or reacting to, changes in our business; and
- placing us at a possible competitive disadvantage with less leveraged competitors and competitors that may have better access to capital resources.

We cannot assure you that we will continue to maintain sufficient cash reserves or that our business will generate cash flow from operations at levels sufficient to permit us to pay principal, premium, if any, and interest on our indebtedness, or that our cash needs will not increase. If we are unable to generate sufficient cash flow or otherwise obtain funds necessary to make required payments, or if we fail to comply with the various requirements of our existing indebtedness or any other indebtedness which we may incur in the future, we would be in default, which could permit the holders of our indebtedness, including the 2020 Notes, to accelerate the maturity of such indebtedness. Any default under such indebtedness could have a material adverse effect on our business, results of operations and financial condition.

In particular, our indebtedness with Whitebox is secured by liens on substantially all of our assets, including our intellectual property. If we are unable to satisfy our obligations under such instruments, Whitebox could foreclose on our assets, including our intellectual property. Any such foreclosure could force us to substantially curtail or cease our operations which could have a material adverse effect on our business, financial condition and results of operations.

As the maturity date for the 2020 Notes approaches, we are evaluating, and will continue to evaluate and opportunistically pursue, our options to refinance or repay such indebtedness, including alternatives in the debt and equity capital markets or discussions with White Box.

If we do not have the capital necessary to repay the 2020 Notes when the 2020 Notes mature, it will be necessary for us to take significant actions, such as revising or delaying our strategic plans, reducing or delaying planned capital expenditures, selling assets, restructuring or refinancing our debt or seeking additional equity capital. We may be unable to effect any of these remedial steps on a satisfactory basis, or at all. If we are unable to refinance or otherwise repay the 2020 Notes upon their maturity, we would be in default under the terms of the indenture governing the 2020 Notes, which would result in material adverse consequences for us.

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We have a history of net losses, and we may not achieve or maintain profitability.

We incurred net losses of $28.0 million, $24.6 million and $37.2 million during the years ended December 31, 2018, 2017 and 2016, respectively. As of December 31, 2018, we had an accumulated deficit of $429.3 million. We expect to incur losses and negative cash flows from operating activities for the foreseeable future. We currently derive revenue primarily from the sale of ethanol, isobutanol and related products at the Luverne Facility, although over certain periods of time, we may and have operated the plant for the sole production of ethanol and related products to maximize cash flows.

Additionally, we have generated limited revenue from the sale of products such as ATJ, isooctane and isooctene produced from isobutanol that has been used for demonstration commercial flights, jet engine qualification and flight demonstration by the U.S. Air Force and other branches of the U.S. military, as well as specialty gasoline applications such as racing fuel. We have also generated revenue through grants and cooperative agreements. If we are unable to obtain new grants, cooperative agreements or product supply contracts, our revenues could be adversely affected.

Furthermore, we expect to spend significant amounts on the further development and commercial implementation of our technology. Our technology is designed to permit the Retrofit of existing ethanol production facilities. A “Retrofit” means either (i) modifying an existing ethanol production facility whereby equipment is added to the facility and the existing fermenters are used to produce isobutanol rather than ethanol, or (ii) modifying an existing ethanol facility to add fermenters and other equipment such that the facility is capable of producing both ethanol and isobutanol simultaneously “side by side.”

We also expect to spend significant amounts acquiring and deploying additional equipment to attain final product specifications that may be required by future customers, on marketing, general and administrative expenses associated with our planned growth, on management of operations as a public company, and on debt service obligations. In addition, the cost of preparing, filing, prosecuting, maintaining and enforcing patent, trademark and other intellectual property rights and defending ourselves against claims by others that we may be violating their intellectual property rights may be significant.

In particular, over time, costs related to defending the validity of our issued patents and challenging the validity of the patents of others at the U.S. Patent and Trademark Office (“USPTO”) may be significant. As a result, even if our revenues increase substantially, we expect that our expenses will exceed revenues for the foreseeable future. We do not expect to achieve profitability during the foreseeable future, and may never achieve it. If we fail to achieve profitability, or if the time required to achieve profitability is longer than we anticipate, we may not be able to continue our business. Even if we do achieve profitability, we may not be able to sustain or increase profitability on a quarterly or annual basis.

We will require substantial additional financing to achieve our goals, and a failure to obtain this capital when needed or on acceptable terms could force us to delay, limit, reduce or terminate our development and commercialization efforts.

Significant portions of our resources have been dedicated to research and development, as well as demonstrating the effectiveness of our technology through the Retrofit of the Luverne Facility. We believe that we will continue to expend substantial resources for the foreseeable future on further developing our technologies, developing future markets for our products, and constructing facilities necessary for the production of our products on a commercial scale. These expenditures may include costs associated with research and development, accessing existing ethanol plants, Retrofitting or otherwise modifying the plants to produce our products, obtaining government and regulatory approvals, acquiring or constructing storage facilities and negotiating supply agreements for the products we produce. In addition, other unanticipated costs may arise. Because the costs of developing our technology at a commercial scale are highly uncertain, we cannot reasonably estimate the amounts necessary to successfully commercialize our production.

To date, we have funded our operations primarily through equity offerings, issuances of debt, borrowing under our secured debt financing arrangements and revenues earned primarily from the sale of ethanol and related products. Based on our current plans and expectations, we will require additional funding to achieve our goals. In addition, the cost of preparing, filing, prosecuting, maintaining and enforcing patent, trademark and other intellectual property rights and defending against claims by others that we may be violating their intellectual property rights may be significant. Moreover, our plans and expectations may change as a result of factors currently unknown to us, and we may need additional funds sooner than planned and may seek to raise additional funds through public or private debt or equity financings in the near future. We may also choose to seek additional capital sooner than required due to favorable market conditions or strategic considerations.

Our future capital requirements will depend on many factors, including:

- the timing of and costs of adding unit operations to achieve low-carbon ethanol;
- the timing of, and costs involved in building out a full scale isobutanol and hydrocarbons plant;
- the timing of, and costs involved in obtaining permits;
- the ability for us to deploy strains of yeast with improved performance that help to lower capital cost;
- the costs involved in acquiring and deploying additional equipment to attain final product specifications including at the Luverne Facility, that may be required by future customers;
- the costs involved in increasing production capacity of our products, including at the Luverne Facility;
- our ability to negotiate agreements supplying suitable biomass to our plants, and the timing and terms of those agreements;
- the timing of, and the costs involved in developing adequate storage facilities for the products we produce;
- our ability to gain market acceptance for isobutanol as a specialty chemical, gasoline blendstock and as a raw material for the production of hydrocarbons;
- our ability to negotiate supply agreements for the products we produce, and the timing and terms of those agreements, including terms related to sales price;
- our ability to negotiate sales of our products and the timing and terms of those sales, including terms related to sales price;

our ability to sell the iDGs left as a co-product of fermenting isobutanol from corn as animal feedstock;
our ability to establish and maintain strategic partnerships, licensing or other arrangements and the timing and terms of those arrangements; and
the cost of preparing, filing, prosecuting, maintaining, defending and enforcing patent, trademark and other intellectual property claims, including litigation costs and the outcome of such litigation.

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Additional funds may not be available when we need them, on terms that are acceptable to us, or at all. In addition, our ability to raise additional funds will be subject to certain limitations in the agreements governing our indebtedness, including the 2020 Notes. If needed funds are not available to us on a timely basis, we may be required to delay, limit, reduce or terminate:

- our research and development activities;
- our plans to build out additional isobutanol and hydrocarbon capacity;
- our plans to operate our ethanol plant;
- our production of products at the Luverne Facility;
- our production of hydrocarbons at the demonstration plant located at the South Hampton facility near Houston, Texas, or any other future facilities;
- our efforts to prepare, file, prosecute, maintain and enforce patent, trademark and other intellectual property rights and defend against claims by others that we may be violating their intellectual property rights; and/or
- our activities in developing storage capacity and negotiating supply agreements that may be necessary for the commercialization of our products.

We may need to cease production at the Luverne Facility due to the condition of our fermentation vessels, unless repaired or replaced.

As an older production facility, the Luverne Facility is more susceptible to maintenance issues that result in production challenges than newer production facilities. In the second quarter of 2017, we hired a third-party engineering firm to test the structural integrity of two of our oldest fermentation vessels. These fermentation vessels are fabricated from carbon steel and are dedicated to ethanol production. Recently, we decided to repair these two carbon steel fermentation vessels. Repairs are expected to be completed by the second quarter of 2019 at the latest, at an estimated cost of approximately $0.6 million. After the repairs, the estimated useful life of the vessels is expected to be 20 years. Also, in the middle of 2018, we hired a third-party engineering firm to test a third carbon steel fermenter. The results indicated the vessel had approximately one year of useful life remaining. We have not made a decision on whether to repair the third fermenter. If we did not repair at least one of these three fermenters in the next 12 months, it is possible we would have had to shut down ethanol production until repaired. If we were to shut down ethanol production, we could not produce isobutanol. Any such production stoppages or costs incurred to repair or replace our fermentation vessels could have a material adverse effect on our business, financial condition and results of operations.

We may be unable to successfully negotiate final, binding terms related to non-binding isobutanol, ATJ and other hydrocarbon supply and distribution agreements, which could harm our commercial prospects.

From time-to-time, we agree to preliminary terms regarding supplying isobutanol or the products derived from it to various companies for their use or further distribution. We may be unable to negotiate final terms with these or other companies in a timely manner, or at all, and there is no guarantee that the terms of any final agreement will be the

same or similar to those currently contemplated in our preliminary agreements. Final terms may include less favorable pricing structures or volume commitments, more expensive delivery or purity requirements, reduced contract durations and other adverse changes. Delays in negotiating final contracts could slow our initial isobutanol commercialization, and failure to agree to definitive terms for sales of sufficient volumes of isobutanol could prevent us from growing our business. To the extent that terms in our initial supply and distribution contracts may influence negotiations regarding future contracts, the failure to negotiate favorable final terms related to our current preliminary agreements could have an especially negative impact on our growth and profitability. Additionally, we have not demonstrated that we can meet the production levels contemplated in our current non-binding supply agreements. If our production scale-up proceeds more slowly than we expect, or if we encounter difficulties in successfully completing the planned expansion of the Luverne Facility, potential customers, including those with whom we have current letters of intent, may be less willing to negotiate definitive supply agreements, or demand terms less favorable to us, and our performance may suffer.

The Luverne Facility is our first commercial ethanol and isobutanol production facility, and, as such, we may be unable to produce planned quantities of ethanol and isobutanol and any such production may be costlier than we anticipate.

Since commencing initial startup operations for the production of isobutanol at the Luverne Facility in May 2012, we have encountered some production challenges, including contamination issues, which have resulted in lower than planned isobutanol production. While we have resumed production of isobutanol at the Luverne Facility, this is our first commercial isobutanol production facility and we may encounter further production challenges, including, but not limited to, being unable to manage plant contamination, and we may add additional processing steps or incur additional capital expenditures to achieve our target customers' product specifications and/or to increase production levels at the facility.

The Luverne Facility has the capability, with certain capital improvements, to produce low-carbon ethanol side-by-side with low-carbon isobutanol, in addition to renewable jet fuel and isooctane and other related products that can be made from isobutanol. Furthermore, by investing additional capital at the Luverne Facility and in the surrounding area, we believe that we can lower the carbon intensity (i.e. lower the carbon dioxide emissions from the plant) creating additional profit margin opportunities in low-carbon markets for ethanol, as well as for our isobutanol and its derivative hydrocarbon products. However, we cannot assure you that we will be able to secure adequate financing to make such improvements or that our capital investments at the Luverne Facility will successfully lower the carbon intensity and/or create additional profit margin opportunities.

In addition, the Luverne Facility was constructed in 1998. As an older production facility, the Luverne Facility may be more susceptible to maintenance issues that result in production challenges than newer production facilities. Any such production challenges may delay our ramp up of production capacity, prevent us from producing significant quantities of isobutanol, significantly increase our cost to produce isobutanol, or cause us to switch to producing ethanol or produce both products simultaneously, which could have a material adverse effect on our business, financial condition and results of operations.

Fluctuations in the price of corn and other feedstocks may affect our cost structure.

Our approach to the biofuels and chemicals markets will be dependent on the price of corn and other feedstocks that will be used to produce ethanol and isobutanol. A decrease in the availability of plant feedstocks or an increase in the price may have a material adverse effect on our financial condition and operating results. At certain levels, prices may make these products uneconomical to use and produce, as we may be unable to pass the full amount of feedstock cost increases on to our customers.

The price and availability of corn and other plant feedstocks may be influenced by general economic, market and regulatory factors. These factors include weather conditions, farming decisions, government policies and subsidies with respect to agriculture and international trade, and global demand and supply. For example, corn prices may increase significantly in response to drought conditions in the Midwestern region of the U.S. and any resulting decrease in the supply of corn could lead to the restriction of corn supplies, which in turn could cause further increases in the price of corn. The significance and relative impact of these factors on the price of plant feedstocks is difficult to predict, especially without knowing what types of plant feedstock materials we may need to use.

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Fluctuations in the price and availability of natural gas may harm our performance.

The Luverne Facility uses significant amounts of natural gas to produce ethanol. Accordingly, our business is dependent upon natural gas supplied by third parties. The prices for and availability of natural gas are subject to volatile market conditions. These market conditions are affected by factors beyond our control, such as weather conditions, overall economic conditions and governmental regulations. Should the price of natural gas increase, our performance could suffer. Likewise, disruptions in the supply of natural gas could have a material impact on our business and results of operations.

Fluctuations in petroleum prices and customer demand patterns may reduce demand for biofuels and bio-based chemicals.

We anticipate marketing our biofuel as an alternative to petroleum-based fuels. Therefore, if the price of oil falls, any revenues that we generate from biofuel products could decline, and we may be unable to produce products that are a commercially viable alternative to petroleum-based fuels. Additionally, demand for liquid transportation fuels, including biofuels, may decrease due to economic conditions or otherwise. We will encounter similar risks in the chemicals industry, where declines in the price of oil may make petroleum-based hydrocarbons less expensive, which could reduce the competitiveness of our bio-based alternatives.

Changes in the prices of distiller's grains and iDGs could have a material adverse effect on our financial condition.

We sell distiller's grains as a co-product from the production of ethanol at the Luverne Facility during any period in which the production of isobutanol is temporarily paused and our management decides that the Luverne Facility will be temporarily reverted to ethanol production, or during periods in which we produce both isobutanol and ethanol simultaneously. We may also sell distiller's grains produced by other ethanol facilities that we acquire, enter into a joint venture or tolling arrangement with, or license to in the future. We also sell the iDGs that are produced as a co-product of our commercial isobutanol production. Distiller's grains and iDGs compete with other animal feed products, and decreases in the prices of these other products could decrease the demand for and price of distiller's grains and iDGs. Additionally, we have produced limited quantities of commercial iDGs and, as such, there is a risk that our iDGs may not meet market requirements. If the price of distiller's grains and iDGs decreases or our iDGs do not meet market requirements, our revenue from the sale of distiller's grains and future revenue from the sale of iDGs could suffer, which could have a material adverse effect on our financial condition.

To the extent that we produce ethanol rather than isobutanol, or during periods in which we make the strategic decision to revert to ethanol production, or produce both products simultaneously, we will be vulnerable to fluctuations in the price of and cost to produce ethanol.

We believe that, like the Luverne Facility, the other third-party ethanol production facilities that we may access can continue to produce ethanol during most of the Retrofit process. In certain cases, we may obtain income from this ethanol production. Further, we have designed our isobutanol production technology (including the Retrofit of the Luverne Facility) to allow us to produce ethanol and isobutanol simultaneously or to produce just ethanol or just isobutanol depending on market conditions. Our earnings from ethanol revenue will be dependent on the price of, demand for and cost to produce ethanol. Decreases in the price of ethanol, whether caused by decreases in gasoline prices, changes in regulations, seasonal fluctuations or otherwise, will reduce our revenues, while increases in the cost of production will reduce our margins. To the extent that ethanol production costs increase or price decreases, earnings from ethanol production could suffer, which could have a material adverse effect on our business.

Sustained narrow commodity margins may cause us to operate at a loss or to reduce or suspend production of ethanol and/or isobutanol at the Luverne Facility, and we may or may not be able to recommence production when margins improve.

Our results from operations will be substantially dependent on commodity prices. Many of the risks associated with volatile commodity prices, including fluctuations in feedstock costs and natural gas costs, apply both to the production of ethanol and isobutanol. Sustained unfavorable commodity prices may cause our combined revenues from sales of ethanol, isobutanol and related co-products to decline below our marginal cost of production. As market conditions change, our management may decide to reduce or suspend production of ethanol and/or isobutanol at the Luverne Facility.

The decision to reduce or suspend production at a facility may create additional costs related to continued maintenance, termination of staff, certain unavoidable fixed costs, termination of customer contracts and increased costs to increase or recommence production in the future. These costs may make it difficult or impractical to increase or recommence production of ethanol and/or isobutanol at the Luverne Facility even if margins improve. In addition, any reduction or suspension of the production of ethanol and/or isobutanol at the Luverne Facility may slow or stop our commercialization process, which could have a material adverse effect on our business, financial condition and results of operations.

We may not be successful in the development of individual steps in the production of commercial quantities of low-carbon ethanol or isobutanol from plant feedstocks in a timely or economic manner, or at all.

As of the date of this Report, we have not produced any low-carbon ethanol and we have produced only limited quantities of isobutanol at commercial scale. We may not be successful producing low-carbon ethanol and we may not be successful in increasing our production of isobutanol from these limited production levels.

Our future success depends on our ability to produce commercial quantities of low-carbon ethanol and isobutanol in a timely and economic manner. While we have produced isobutanol using our biocatalysts at the Luverne Facility in commercial-scale fermenters, our biocatalysts have not yet produced isobutanol at fully optimized levels in fermenters typical of full scale operation at a commercial facility. The risk of contamination and other problems rises as we increase the scale of our isobutanol production. If we are unable to successfully manage these risks, we may encounter difficulties in achieving our target isobutanol production yield, rate, concentration or purity at a commercial scale, which could delay or increase the costs involved in commercializing our isobutanol production.

The technological and logistical challenges associated with producing, marketing, selling and distributing low-carbon ethanol and isobutanol are extraordinary, and we may not be able to resolve any difficulties that arise in a timely or cost-effective manner, or at all.

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Prior to our purchase of the Luverne Facility, we had never operated or built (through Retrofit or otherwise) a commercial ethanol or isobutanol facility. We believe that we understand the engineering and process characteristics necessary to successfully build the additional facilities that we are contemplating and to scale up to larger facilities. We expect to incur additional capital expenditures to produce low-carbon ethanol and increase low-carbon ethanol and isobutanol production levels at the Luverne Facility. Our assumptions, however, may prove to be incorrect. Accordingly, we cannot be certain that we can consistently produce low-carbon ethanol and isobutanol in an economical manner in commercial quantities. If our costs to build a commercial facility to produce low-carbon ethanol and/or to increase isobutanol production are significantly higher than we expect or if we fail to consistently produce low-carbon ethanol and/or isobutanol economically on a commercial scale or in commercial volumes, our commercialization of isobutanol and our business, financial condition and results of operations will be materially adversely affected.

The technological and logistical challenges associated with producing, marketing, selling and distributing low-carbon ethanol and isobutanol are extraordinary, and we may not be able to resolve any difficulties that arise in a timely or cost-effective manner, or at all.

Prior to our purchase of the Luverne Facility, we had never operated or built (through Retrofit or otherwise) a commercial ethanol or isobutanol facility. We believe that we understand the engineering and process characteristics necessary to successfully build the additional facilities that we are contemplating and to scale up to larger facilities. We expect to incur additional capital expenditures to produce low-carbon ethanol and increase low-carbon ethanol and isobutanol production levels at the Luverne Facility. Our assumptions, however, may prove to be incorrect. Accordingly, we cannot be certain that we can consistently produce low-carbon ethanol and isobutanol in an economical manner in commercial quantities. If our costs to build a commercial facility to produce low-carbon ethanol and/or to increase isobutanol production are significantly higher than we expect or if we fail to consistently produce low-carbon ethanol and/or isobutanol economically on a commercial scale or in commercial volumes, our commercialization of low-carbon ethanol, isobutanol and our business, financial condition and results of operations will be materially adversely affected.

We have entered into a licensing agreement with Porta Hnos S.A. ("Porta") to Retrofit their facility in Argentina, and the production of isobutanol at the Porta facility could be delayed and, as a result, any royalties or other revenues expected to be derived from the licensing agreement may be delayed.

In January 2016, we entered into a license agreement and joint development agreement with Porta to construct multiple isobutanol plants in Argentina using corn as a feedstock, the first of which is expected to be wholly owned by Porta (the "Porta Facility"). The Porta Facility is expected to have a production capacity of up to five million gallons of isobutanol per year. Once the Porta Facility is operational, Gevo expects to generate revenues from this licensing arrangement, through royalties, sales and marketing fees, and other revenue streams such as yeast sales. The agreements also contemplate Porta constructing at least three additional isobutanol plants for certain of their existing ethanol plant customers. For these projects, Gevo would be the direct licensor of its technology and the marketer for any isobutanol produced, and would expect to receive all royalties and sales and marketing fees generated from these

projects. Porta would provide the engineering, procurement and construction ("EPC") services for the projects. The production capacity of these additional plants is still to be determined.

Although we will be able to apply our experience from the Retrofit of the Luverne Facility, no two ethanol facilities are exactly alike, and each Retrofit or construction project will require individualized engineering and design work. Unexpected difficulties unique to the Porta Facility may cause delays in commencing production, and there is no guarantee that we will be successful in properly completing the project. Any such unexpected difficulties could delay or limit the revenues that we are able to derive from the licensing arrangement with Porta. Moreover, there can be no assurances that the Retrofit of the Porta facility will ever be completed or Porta will construct other isobutanol plants as contemplated. If the Porta Facility project is not completed or if Porta does not construct additional isobutanol facilities, Gevo will not generate any revenue. In addition, if Porta experiences delays or is unsuccessful in completing the Porta Facility project, this may limit our ability to license our technology to others, which could reduce the scope of our business plan and have a material adverse effect on our results of operations. In addition, if we experience delays or are unsuccessful in completing the Porta Facility project, this may limit our ability to license our technology to others, which could reduce the scope of our business plan and have a material adverse effect on our results of operations.

Our development strategy relies on our relationships with partners such as Praj Industries Limited ("Praj") and Porta.

In November 2015, we entered into a joint development agreement and a development license agreement with Praj with the goal for Praj to adapt our isobutanol technology to using non-corn based sugars and lignocellulose feedstocks. Praj is one of the leading suppliers of EPC services to the ethanol industry globally, having provided such services to approximately 350 ethanol plants across 65 countries. As a result, we believe that our alliance with Praj will allow us to more quickly achieve commercial-scale production of isobutanol derived from feedstock outside of the U.S. Porta is a leading supplier of EPC services to the ethanol industry in South America. As a result, we believe that our alliance with Porta will allow us to more quickly achieve commercial-scale production of isobutanol in Argentina and potentially elsewhere in South America. However, Praj and Porta may fail to fulfill their obligations to us under our agreements with them such as failing to meet milestones associated with our joint development agreement. If Praj and Porta fail to fulfill their obligations to us under our agreements, our ability to realize continued development and commercial benefits from our alliance could be affected and our business and prospects could be harmed.

In addition, we may be unable to secure other partners beyond Praj and Porta to assist us in developing commercial isobutanol projects globally. If we are unable to secure such additional partnerships, our business and prospects could be harmed.

Our facilities and processes may fail to produce products at the volumes, rates and costs we expect.

Some or all of our future production facilities may be in locations distant from corn or other feedstock sources, which could increase our feedstock costs or prevent us from acquiring sufficient feedstock volumes for commercial

production. General market conditions might also cause increases in feedstock prices, which could likewise increase our production costs.

Even if we secure access to sufficient volumes of feedstock, our production facilities may fail to perform as expected. The equipment and subsystems that we install in our production facilities may never operate as planned. Our systems may prove incompatible with the original facility, or require additional modification after installation. Unexpected problems may force us to cease or delay production and the time and costs involved with such delays may prove prohibitive. Any or all of these risks could prevent us from achieving the production throughput and yields necessary to achieve our target annualized production run rates and/or to meet the volume demands or minimum requirements of our customers, including pursuant to definitive supply or distribution agreements that we may enter into, which may subject us to monetary damages. Failure to achieve these rates or meet these minimum requirements, or achieving them only after significant additional expenditures, could substantially harm our commercial performance.

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We may be unable to produce isobutanol, ATJ or other products in accordance with customer specifications.

Even if we produce isobutanol, ATJ or other products at our targeted rates, we may be unable to produce these products to meet customer specifications, including those defined in ASTM D7862 "Standard Specification for Butanol for Blending with Gasoline for Use as Automotive Spark-Ignition Engine Fuel" or ASTM D7566 "Standard Specifications for Aviation Turbine Fuel Containing Synthesized Hydrocarbons." We may need to add additional processing steps or incur capital expenditures in order to meet customer specifications which could add significant costs to our production process. If we fail to meet specific product or volume specifications contained in a supply agreement, the customer may have the right to seek an alternate supply of isobutanol and/or terminate the agreement completely, and we could be required to pay shortfall fees or otherwise be subject to damages. A failure to successfully meet the specifications of our potential customers could decrease demand, and significantly hinder market adoption of our products.

We lack significant experience operating commercial-scale ethanol and isobutanol facilities, and may encounter substantial difficulties operating commercial plants or expanding our business.

We have very limited experience operating commercial-scale ethanol and isobutanol facilities concurrently. Accordingly, we may encounter significant difficulties operating at a commercial scale once both production facilities are built out in a side-by-side operation. We believe that our future facilities will, like the Luverne Facility, be able to continue producing ethanol during much of the Retrofit process. We will need to successfully administer and manage this production. Although the employees at the Luverne Facility are experienced in the operation of ethanol facilities, and our future development partners or the entities that we acquire may likewise have such experience, we may be unable to manage ethanol-producing operations, especially given the possible complications associated with a simultaneous Retrofit. Once we complete a commercial Retrofit, operational difficulties may increase, because neither we nor anyone else has significant experience operating a pure isobutanol fermentation facility at a commercial scale. The skills and knowledge gained in operating commercial ethanol facilities or small-scale isobutanol plants may prove insufficient for successful operation of a large-scale isobutanol facility, and we may be required to expend significant time and money to develop our capabilities in isobutanol facility operation. We may also need to hire new employees or contract with third parties to help manage our operations, and our performance will suffer if we are unable to hire qualified parties or if they perform poorly.

We may face additional operational difficulties as we further expand our production capacity. Integrating new facilities with our existing operations may prove difficult. Rapid growth, resulting from our operation of, or other involvement with, isobutanol facilities or otherwise, may impose a significant burden on our administrative and operational resources. To effectively manage our growth and execute our expansion plans, we will need to expand our administrative and operational resources substantially and attract, train, manage and retain qualified management, technicians and other personnel. We may be unable to do so. Failure to meet the operational challenges of developing and managing increased production of isobutanol and/or ethanol, or failure to otherwise manage our growth, may have a material adverse effect on our business, financial condition and results of operations.

We may have difficulty adapting our technology to commercial-scale fermentation, which could delay or prevent our commercialization of isobutanol.

While we have demonstrated the ability to produce isobutanol under the demonstration plant operating conditions and under commercial scale operating conditions at the Luverne Facility, and we have succeeded in reaching our commercial fermentation performance targets for isobutanol concentration, fermentation productivity and isobutanol yield in laboratory tests, we have not yet reached all performance targets in a commercial plant environment at the larger scale we contemplate constructing involving multiple fermenters. Ultimately, our yeast biocatalyst may not be able to meet the commercial performance targets in a timely manner, or ever. In addition, the risk of contamination and other problems may increase as we seek to ramp up our production capacity, which could negatively impact our cost of production or require additional capital expenditures to solve for these problems. If we encounter difficulties in optimizing our production, our commercialization of isobutanol and our business, financial condition and results of operations will be materially adversely affected.

We may have difficulties gaining market acceptance and successfully marketing our ethanol, isobutanol and other hydrocarbon products to customers, including chemical producers, fuel distributors and refiners.

A key component of our business strategy to become profitable is to invest capital to upgrade the Luverne Facility to primarily produce low-carbon ethanol for the California market, and a key component of our business strategy is to market our isobutanol and other hydrocarbon products to chemical producers, fuels distributors, refiners and other fuel and chemical industry market participants. We have no experience marketing ethanol to the California market or isobutanol on a commercial scale and we may fail to successfully negotiate marketing agreements in a timely manner or on favorable terms. If we fail to successfully market our ethanol to the California market or isobutanol to refiners, fuels distributors, chemical producers and others, our business, financial condition and results of operations will be materially adversely affected.

We also intend to market our isobutanol to chemical producers for use in making various chemicals such as isobutylene, a type of butene that can be produced through the dehydration of isobutanol. Although a significant market currently exists for isobutylene produced from petroleum, which is widely used in the production of plastics, specialty chemicals, alkylate for gasoline blending and high octane aviation gasoline, no one has successfully created isobutylene on a commercial scale from bio-isobutanol. Therefore, to gain market acceptance and successfully market our isobutanol to chemical producers, we must show that our isobutanol can be converted into isobutylene at a commercial scale. As no company currently dehydrates commercial volumes of isobutanol into isobutylene, we must demonstrate the large-scale feasibility of the process and potentially reach agreements with companies that are willing to invest in the necessary dehydration infrastructure. Failure to reach favorable agreements with these companies, or the inability of their plants to convert isobutanol into isobutylene at sufficient scale, may slow our development in the chemicals market and could significantly affect our profitability.

Obtaining market acceptance in the chemicals industry is complicated by the fact that many potential chemicals industry customers have invested substantial amounts of time and money in developing petroleum-based production channels. These potential customers generally have well-developed manufacturing processes and arrangements with suppliers of chemical components, and may display substantial resistance to changing these processes. Pre-existing contractual commitments, unwillingness to invest in new infrastructure, distrust of new production methods and lengthy relationships with current suppliers may all slow market acceptance of isobutanol.

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A very limited market currently exists for isobutanol as a fuel or as a gasoline blendstock. Therefore, to gain market acceptance and successfully market our isobutanol to fuels distributors and refiners, we must effectively demonstrate the commercial advantages of using isobutanol over other biofuels and blendstocks, as well as our ability to produce isobutanol reliably on a commercial scale at a sufficiently low cost. We must show that isobutanol is compatible with existing infrastructure and does not damage pipes, engines, storage facilities or pumps. We must also overcome marketing and lobbying efforts by producers of other biofuels and blendstocks, including ethanol, many of whom may have greater resources than we do. If the markets for isobutanol as a fuel or as a gasoline blendstock do not develop as we currently anticipate, or if we are unable to penetrate these markets successfully, our revenue and growth rate could be materially and adversely affected.

We believe that consumer demand for environmentally sensitive products will drive demand among large brand owners for low-carbon ethanol, isobutanol and renewable hydrocarbon sources. One of our marketing strategies is to leverage this demand to obtain commitments from large brand owners to purchase our products. We believe these commitments will, in turn, promote chemicals industry demand for our isobutanol and hydrocarbon products. If consumer demand for environmentally sensitive products fails to develop at sufficient scale or if such demand fails to drive large brand owners to seek sources of renewable isobutanol or hydrocarbons, our revenue and growth rate could be materially and adversely affected.

We may have difficulties scaling up our hydrocarbon technology, and, as such, we may be unable to produce commercial quantities of our hydrocarbons, and any such production may be costlier than we anticipate

We have developed the Silsbee Facility in Silsbee, Texas, in partnership with South Hampton. Currently, the Silsbee Facility can produce approximately 100,000 gallons of renewable hydrocarbons from our renewable isobutanol for use as fuels and chemicals. We have demonstrated the ability to convert our isobutanol at this level into products such as ATJ, isooctane, isooctene and par-xylene.

The production and sale of commercial volumes of hydrocarbons such as ATJ, isooctane and isooctene, produced from our isobutanol is anticipated to be an important part of our future business plans. However, we may encounter challenges in scaling up our process to convert isobutanol into hydrocarbon products successfully. In addition, the cost to construct commercial hydrocarbons facilities or the production costs associated with the operation of such facilities may be higher than we project. If we encounter such difficulties, this may significantly impact the development of the markets for our hydrocarbon products and could significantly affect our profitability.

We may be reliant on Butamax to develop certain markets for isobutanol.

As part of the License Agreement entered into with Butamax, it was agreed that Butamax would take the lead in developing the markets for on-road gasoline blendstocks. This would entail progressing the required approvals for these markets, as well as managing the marketing and distribution of our isobutanol and our potential licensee's isobutanol in these markets beyond certain minimum volumes. On June 12, 2018, the EPA announced that it approved the registration of isobutanol as a fuel additive for blending into gasoline at levels up to 16 volume percent for on-road automotive use. If Butamax is unable to maintain or obtain the necessary approvals to sell isobutanol into the on-road gasoline blendstock markets, or if it is unsuccessful in building market demand for isobutanol as an on-road gasoline blendstock, our revenue and growth rate could be materially and adversely affected.

We may be required to pay Butamax royalties for selling isobutanol into certain markets, which could hinder our ability to competitively sell our isobutanol into those markets.

As part of the License Agreement entered into with Butamax, it was agreed that we, and our potential licensees, may be required to pay Butamax royalties for selling isobutanol into the on-road gasoline blendstock markets and the chemical isobutylene applications markets beyond certain minimum volumes. The addition of these royalties may make our isobutanol uncompetitive from a price perspective, which may hinder our ability to sell into these markets. If this is the case, our revenue and growth rate could be materially and adversely affected.

Even if we are successful in consistently producing low-carbon ethanol, isobutanol and our hydrocarbon products on a commercial scale, we may not be successful in negotiating sufficient supply agreements for our production.

We expect that many of our customers will be large companies with extensive experience operating in the fuels or chemicals markets. As an early stage company, we lack commercial operating experience, and may face difficulties in developing marketing expertise in these fields. Our business model relies upon our ability to successfully negotiate and structure long-term supply agreements for the isobutanol and other products we produce. Certain agreements with existing and potential customers may initially only provide for the purchase of limited quantities from us. Our ability to increase our sales will depend in large part upon our ability to expand these existing customer relationships into long-term supply agreements. Maintaining and expanding our existing relationships and establishing new ones can require substantial investment without any assurance from customers that they will place significant orders. In addition, many of our potential customers may be more experienced in these matters than we are, and we may fail to successfully negotiate these agreements in a timely manner or on favorable terms which, in turn, may force us to slow our production, dedicate additional resources to increasing our storage capacity and/or dedicate resources to sales in spot markets. Furthermore, should we become more dependent on spot market sales, our profitability will become increasingly vulnerable to short-term fluctuations in the price and demand for petroleum-based fuels and competing substitutes.

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Even if we are successful in consistently producing low-carbon ethanol, isobutanol and our hydrocarbon products on a commercial scale, we may not be successful in negotiating pricing terms sufficient to generate positive results from operations at the Luverne Facility.

We expect that many of our customers will be large companies with extensive experience operating in the fuels or chemicals markets. As an early stage company, we lack commercial operating experience, and may face difficulties in developing marketing expertise in these fields. Our business model relies upon our ability to negotiate pricing terms for the low-carbon ethanol, isobutanol and other products we produce that generate positive results from the operations of the Luverne Facility. Many of our potential customers may be more experienced in these matters than we are. We may fail to negotiate these agreements in a timely manner, which may force us to dedicate resources to sales in spot markets. If we become more dependent on spot market sales our profitability will become increasingly vulnerable to short-term fluctuations in the price and demand for our products.

Our isobutanol may be less compatible with existing refining and transportation infrastructure than we believe, which may hinder our ability to market our product on a large scale.

We developed our business model based on our belief that our isobutanol is fully compatible with existing refinery infrastructure. For example, when making isobutanol blends, we believe that gasoline refineries will be able to pump our isobutanol through their pipes and blend it in their existing facilities without damaging their equipment. If our isobutanol proves unsuitable for such handling, it will be more expensive for refiners to use our isobutanol than we anticipate, and they may be less willing to adopt it as a gasoline blendstock, forcing us to seek alternative purchasers.

Likewise, our plans for marketing our isobutanol are based upon our belief that it will be compatible with the pipes, tanks and other infrastructure currently used for transporting, storing and distributing gasoline. If our isobutanol or products incorporating our isobutanol cannot be transported with this equipment, we will be forced to seek alternative transportation arrangements, which will make our isobutanol and products produced from our isobutanol more expensive to transport and less appealing to potential customers. Reduced compatibility with either refinery or transportation infrastructure may slow or prevent market adoption of our isobutanol, which could substantially harm our performance.

A sustained low oil price environment may negatively impact the price we receive for the sale of our ethanol, isobutanol and hydrocarbon products.

Many of our end-products such as isobutanol, ethanol and hydrocarbon products have some level of price correlation with crude oil. If crude oil prices were to remain at low levels over a sustained period of time, this may have an impact on the pricing that we are able to achieve in the marketplace for many of those end-products. This may cause us to

operate at a lower, or negative, operating margins and, as a result, our management may decide to reduce or suspend production of ethanol and/or isobutanol at the Luverne Facility. Unfavorable operating margins may also impact our ability to enter into commercial agreements with development partners or licensees.

If we engage in additional acquisitions, we will incur a variety of costs and may potentially face numerous risks that could adversely affect our business and operations.

If appropriate opportunities become available, we may acquire businesses, assets, technologies or products to enhance our business in the future. In connection with any future acquisitions, we could, subject to certain limitations in the agreements governing our indebtedness, including our secured indebtedness with Whitebox:

- issue additional equity securities which would dilute our current stockholders;
- incur substantial debt to fund the acquisitions; or
- assume significant known or unknown liabilities.

Acquisitions involve numerous risks, including problems integrating the purchased operations, technologies or products, unanticipated costs and other liabilities, diversion of management's attention from our core business, adverse effects on existing business relationships with current and/or prospective partners, customers and/or suppliers, risks associated with entering markets in which we have no or limited prior experience and potential loss of key employees. Other than our acquisition of the Luverne Facility, we have not engaged in acquisitions in the past, and do not have experience in managing the integration process. Therefore, we may not be able to successfully integrate any businesses, assets, products, technologies or personnel that we might acquire in the future without a significant expenditure of operating, financial and management resources, if at all. The integration process could divert management time from focusing on operating our business, result in a decline in employee morale and cause retention issues to arise from changes in compensation, reporting relationships, future prospects or the direction of the business. In addition, we may acquire companies that have insufficient internal financial controls, which could impair our ability to integrate the acquired company and adversely impact our financial reporting. If we fail in our integration efforts with respect to acquisitions and are unable to efficiently operate as a combined organization, our business, financial condition and results of operations may be materially adversely affected.

If we engage in additional joint ventures, we will incur a variety of costs and may potentially face numerous risks that could adversely affect our business and operations.

If appropriate opportunities become available, we may enter into joint ventures with the owners of existing ethanol production facilities in order to acquire access to additional isobutanol production capacity. We currently anticipate that in each such joint venture, the ethanol producer would contribute access to its existing ethanol production facility and we would be responsible for Retrofitting such facility to produce isobutanol. Upon completion of the Retrofit, and in some cases the attainment of certain performance targets, both parties to the joint venture would receive a portion of the profits from the sale of isobutanol, consistent with our business model. In connection with these joint ventures, we could incur substantial debt to fund the Retrofit of the accessed facilities and we could assume significant

liabilities.

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Realizing the anticipated benefits of joint ventures, including projected increases to production capacity and additional revenue opportunities, involves a number of potential challenges. The failure to meet these challenges could seriously harm our financial condition and results of operations. Joint ventures are complex and time-consuming and we may encounter unexpected difficulties or incur unexpected costs related to such arrangements, including:

- difficulties negotiating joint venture agreements with favorable terms and establishing relevant performance metrics;
- difficulties completing the Retrofits of the accessed facilities using our integrated fermentation technology;
- the inability to meet applicable performance targets related to the production of isobutanol;
- difficulties obtaining the permits and approvals required to produce and sell our products in different geographic areas;
- complexities associated with managing the geographic separation of accessed facilities;
- diversion of management attention from ongoing business concerns to matters related to the joint ventures;
- difficulties maintaining effective relationships with personnel from different corporate cultures; and
- the inability to generate sufficient revenue to offset Retrofit costs.

Additionally, our joint venture partners may have liabilities or adverse operating issues that we fail to discover through due diligence prior to entering into the joint ventures. In particular, to the extent that our joint venture partners failed to comply with or otherwise violated applicable laws or regulations, or failed to fulfill their contractual obligations, we may suffer financial harm and/or reputational harm for these violations or otherwise be adversely affected.

Our joint venture partners may have significant amounts of existing debt and may not be able to service their existing debt obligations, which could cause the failure of a specific project and the loss by us of any investment we have made to Retrofit the facilities owned by the joint venture partner. In addition, if we are unable to meet specified performance targets related to the production of isobutanol at a facility owned by one of our joint venture partners, we may never become eligible to receive a portion of the profits of the joint venture and may be unable to recover the costs of Retrofitting the facility.

Additionally, we plan to be a leading marketer for all isobutanol and co-products produced using our proprietary technology and sold in markets other than on-road gasoline blendstocks including, without limitation, all isobutanol that is produced by any facilities that we access via joint venture. Marketing agreements can be very complex and the obligations that we assume as a leading marketer of isobutanol may be time consuming. We have no experience marketing isobutanol on a commercial scale and we may fail to successfully negotiate marketing agreements in a timely manner or on favorable terms. If we fail to successfully market the isobutanol produced using our proprietary technology to refiners and chemical producers, our business, financial condition and results of operations will be materially adversely affected.

If we lose key personnel, including key management personnel, or are unable to attract and retain additional personnel, it could delay our product development programs and harm our research and development efforts, make

it more difficult to pursue partnerships or develop our own products or otherwise have a material adverse effect on our business.

Our business is complex and we intend to target a variety of markets. Therefore, it is critical that our management team and employee workforce are knowledgeable in the areas in which we operate. The departure, illness or absence of any key members of our management, including our named executive officers, or the failure to attract or retain other key employees who possess the requisite expertise for the conduct of our business, could prevent us from developing and commercializing our products for our target markets and entering into partnerships or licensing arrangements to execute our business strategy. In addition, the loss of any key scientific staff, or the failure to attract or retain other key scientific employees, could prevent us from developing and commercializing our products for our target markets and entering into partnerships or licensing arrangements to execute our business strategy. We may not be able to attract or retain qualified employees in the future due to the intense competition for qualified personnel among biotechnology and other technology-based businesses, particularly in the advanced biofuels area, or due to the limited availability of personnel with the qualifications or experience necessary for our renewable chemicals and advanced biofuels business. If we are not able to attract and retain the necessary personnel to accomplish our business objectives, we may experience staffing constraints that will adversely affect our ability to meet the demands of our partners and customers in a timely fashion or to support our internal research and development programs. In particular, our product and process development programs are dependent on our ability to attract and retain highly skilled scientists. Competition for experienced scientists and other technical personnel from numerous companies and academic and other research institutions may limit our ability to do so on acceptable terms. All of our employees are at-will employees, meaning that either the employee or we may terminate their employment at any time.

Our planned activities will require additional expertise in specific industries and areas applicable to the products and processes developed through our technology platform or acquired through strategic or other transactions, especially in the end markets that we seek to penetrate. These activities will require the addition of new personnel, and the development of additional expertise by existing personnel. The inability to attract personnel with appropriate skills or to develop the necessary expertise could impair our ability to grow our business.

Our government grants are subject to uncertainty, which could harm our business and results of operations.

We have received various government grants, including a cooperative agreement, to complement and enhance our own resources. We may seek to obtain government grants and subsidies in the future to offset all or a portion of our operating costs and the costs of our research and development activities. We cannot be certain that we will be able to secure any such government grants or subsidies. Any new grants that we may obtain may be terminated, modified or recovered by the granting governmental body under certain conditions.

We may also be subject to audits by government agencies as part of routine audits of our activities funded by our government grants. As part of an audit, these agencies may review our performance, cost structures and compliance with applicable laws, regulations and standards. Funds available under grants must be applied by us toward the research and development programs specified by the granting agencies, rather than for all of our programs generally. If any of our costs are found to be allocated improperly, the costs may not be reimbursed and any costs already

reimbursed may have to be refunded. Accordingly, an audit could result in an adjustment to our revenues and results of operations.

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We may face substantial competition from companies with greater resources and financial strength which could adversely affect our performance and growth.

We may face substantial competition in the markets for ethanol, isobutanol, polyester, rubber, plastics, fibers, other polymers and hydrocarbon fuels. Our competitors include companies in the incumbent petroleum-based industry as well as those in the nascent biorenewable industry. The incumbent petroleum-based industry benefits from a large established infrastructure, production capability and business relationships. The incumbents' greater resources and financial strength provide significant competitive advantages that we may not be able to overcome in a timely manner. Academic and government institutions may also develop technologies which will compete with us in the chemicals, solvents and blendstock markets.

Our ability to compete successfully will depend on our ability to develop proprietary products that reach the market in a timely manner and are technologically superior to and/or are less expensive than other products on the market. Many of our competitors have substantially greater production, financial, research and development, personnel and marketing resources than we do. In addition, certain of our competitors may also benefit from local government subsidies and other incentives that are not available to us. As a result, our competitors may be able to develop competing and/or superior technologies and processes, and compete more aggressively and sustain that competition over a longer period of time than we could. Our technologies and products may be rendered obsolete or uneconomical by technological advances or entirely different approaches developed by one or more of our competitors. As more companies develop new intellectual property in our markets, the possibility of a competitor acquiring patent or other rights that may limit our products or potential products increases, which could lead to litigation. Furthermore, to secure purchase agreements from certain customers, we may be required to enter into exclusive supply contracts, which could limit our ability to further expand our sales to new customers. Likewise, major potential customers may be locked into long-term, exclusive agreements with our competitors, which could inhibit our ability to compete for their business.

In addition, various governments have recently announced a number of spending programs focused on the development of clean technologies, including alternatives to petroleum-based fuels and the reduction of carbon emissions. Such spending programs could lead to increased funding for our competitors or a rapid increase in the number of competitors within those markets.

Our limited resources relative to many of our competitors may cause us to fail to anticipate or respond adequately to new developments and other competitive pressures. This failure could reduce our competitiveness and market share, adversely affect our results of operations and financial position and prevent us from obtaining or maintaining profitability.

Our future success will depend on our ability to maintain a competitive position with respect to technological advances.

The biorenewable industry is characterized by rapid technological change. Our future success will depend on our ability to maintain a competitive position with respect to technological advances. Technological development by others may impact the competitiveness of our products in the marketplace. Competitors and potential competitors who have greater resources and experience than we do may develop products and technologies that make ours obsolete or may use their greater resources to gain market share at our expense.

We may face significant and substantial competition as it relates to our proprietary biofuels which could adversely affect our performance and growth.

In the ethanol market, we operate in a highly competitive industry in the U.S. According to the Renewable Fuels Association, there are over 200 ethanol facilities in the U.S. with an installed nameplate capacity of almost 15 billion gallons. Some of the key competitors in the U.S. include Archer-Daniels-Midland Company, Green Plains, Inc., POET, LLC and Valero Energy Corporation. We also face competition from foreign producers of ethanol. Brazil is believed to be the world's second largest ethanol producing country. Many producers have much larger production capacities and operate at a lower cost of production than we do. As a result, these companies may be able to compete more effectively in narrower commodity margin environments.

In the production of isobutanol, we face competition from Butamax. Additionally, a number of companies including Cathay Industrial Biotech, Ltd., Green Biologics Ltd., METabolic Explorer, S.A. and Eastman Chemical Company (which acquired TetraVitae Bioscience, Inc. in November 2011) are developing n-butanol production capability from a variety of renewable feedstocks.

In the gasoline blendstock market, we will compete with our isobutanol against renewable ethanol producers (including those working to produce ethanol from cellulosic feedstocks), producers of alkylate from petroleum and producers of other blendstocks, all of whom may reduce our ability to obtain market share or maintain our price levels. If any of these competitors succeed in producing blendstocks more efficiently, in higher volumes or offering superior performance than our isobutanol, our financial performance may suffer. Furthermore, if our competitors have more success marketing their products or reach development or supply agreements with major customers, our competitive position may also be harmed.

In the production of other biofuels, including our hydrocarbon products, key competitors include Shell Oil Company, BP, Neste Corporation, Altair Engineering, Inc., Fulcrum Bioenergy, Inc., Red Rocks Biofuels LLC, POET, LLC, ICM, Inc., Mascoma Corporation, Inbicon A/S, INEOS New Planet BioEnergy LLC, Archer Daniels Midland Company, BlueFire Renewables, Inc., Iogen Corporation, and many smaller startup companies. If these companies are successful in establishing low cost cellulosic ethanol or other fuel production, it could negatively impact the market for our isobutanol as a gasoline blendstock. In the markets for the hydrocarbon fuels that we plan to produce from our isobutanol, we will face competition from the incumbent petroleum-based fuels industry. The incumbent petroleum-based fuels industry makes the vast majority of the world's gasoline, jet and diesel fuels and blendstocks. It is a mature industry with a substantial base of infrastructure for the production and distribution of petroleum-derived products. The size, established infrastructure and significant resources of many companies in this industry may put us at a substantial competitive disadvantage and delay or prevent the establishment and growth of our business in the

market for hydrocarbon fuels.

Biofuels companies may also provide substantial competition in the hydrocarbon fuels market. With respect to production of renewable gasoline, biofuels competitors are numerous and include both large established companies and numerous startups. For example, Virent Energy Systems, Inc. has developed a process for making gasoline and gasoline blendstocks. Many other competitors may do so as well. In the jet fuel market, we will face competition from companies such as Synthetic Genomics, Inc., and Exxon-Mobil Corporation that are pursuing production of jet fuel from algae-based technology. Renewable Energy Group, Inc. and others are also targeting production of jet fuels from vegetable oils and animal fats. Red Rock Biofuels LLC and others are planning to produce jet fuel from renewable biomass. We may also face competition from companies working to produce jet fuel from hydrogenated fatty acid methyl esters. In the diesel fuels market, competitors such as Amyris Biotechnologies, Inc., Renewable Energy Group, Inc., Fulcrum Bioenergy, Inc., Neste Corporation and Altair Engineering, Inc., have developed technologies for production of alternative hydrocarbon diesel fuel.

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Our competitive position in the polyester, rubber, plastics, fibers and other polymers markets versus the incumbent petroleum-derived products and other renewable butanol producers may not be favorable.

In the polyester, rubber, plastics, fibers and other polymers markets, we face competition from incumbent petroleum-derived products, other renewable isobutanol producers and renewable n-butanol producers. Our competitive position versus the incumbent petroleum-derived products and other renewable butanol producers may not be favorable. Petroleum-derived products have dominated the market for many years and there is substantial existing infrastructure for production from petroleum sources, which may impede our ability to establish a position in these markets. Other isobutanol and n-butanol companies may develop technologies that prove more effective than our isobutanol production technology, or such companies may be more adept at marketing their production. Additionally, one company in France, Global Bioenergies, S.A., is pursuing the production of isobutylene from renewable carbohydrates directly. Since conversion of isobutanol to butenes such as isobutylene is a key step in producing many polyester, rubber, plastics, fibers and other polymers from our isobutanol, this direct production of renewable isobutylene, if successful, could limit our opportunities in these markets.

In the polyester, rubber, plastics, fibers and other polymers markets, we expect to face vigorous competition from existing technologies. The companies we may compete with may have significantly greater access to resources, far more industry experience and/or more established sales and marketing networks. Additionally, since we do not plan to produce most of these products directly, we will depend on the willingness of potential customers to purchase and convert our isobutanol into their products. These potential customers generally have well-developed manufacturing processes and arrangements with suppliers of the chemical components of their products and may have a resistance to changing these processes and components. These potential customers frequently impose lengthy and complex product qualification procedures on their suppliers, influenced by consumer preference, manufacturing considerations such as process changes and capital and other costs associated with transitioning to alternative components, supplier operating history, regulatory issues, product liability and other factors, many of which are unknown to, or not well understood by, us. Satisfying these processes may take many months or years. If we are unable to convince these potential customers that our isobutanol is comparable or superior to the alternatives that they currently use, we will not be successful in entering these markets and our business will be adversely affected.

Business interruptions could delay us in the process of developing our products and could disrupt our sales.

We are vulnerable to natural disasters and other events that could disrupt our operations, such as riots, civil disturbances, war, terrorist acts, floods, infections in our laboratory or production facilities or those of our contract manufacturers and other events beyond our control. We do not have a detailed disaster recovery plan. In addition, we may not carry sufficient business interruption insurance to compensate us for losses that may occur. Any losses or damages we incur could have a material adverse effect on our cash flows and success as an overall business.

Our business and operations would suffer in the event of system failures.

Our business is dependent on proprietary technologies, processes and information that we have developed, much of which is stored on our computer systems. Despite the implementation of security measures, our internal computer systems are vulnerable to damage from computer viruses, human error, unauthorized access, natural disasters, intentional acts of vandalism, terrorism, war and telecommunication and electrical failures. Any system failure, accident or security breach that causes interruptions in our operations could result in a material disruption of our business. To the extent that any disruption or security breach results in a loss or damage to our data or inappropriate disclosure of confidential or proprietary information, we may incur liability, reputation damage and harm to our business operations.

We may engage in hedging transactions, which could harm our business.

We have historically engaged in hedging transactions to offset some of the effects of volatility in commodity prices. We have generally followed a policy of using exchange-traded futures contracts to reduce our net position in agricultural commodity inventories and forward purchase contracts to manage price risk. Hedging activities may cause us to suffer losses, such as if we purchase a position in a declining market or sell a position in a rising market. Furthermore, hedging exposes us to the risk that we may have under- or over-estimated our need for a specific commodity or that the other party to a hedging contract may default on its obligation. If there are significant swings in commodity prices, or if we purchase more corn for future delivery than we can process, we may have to pay to terminate a futures contract, resell unneeded corn inventory at a loss, or produce our products at a loss, all of which would have a material adverse effect on our financial performance. We may vary the hedging strategies we undertake, which could leave us more vulnerable to increases in commodity prices or decreases in the prices of isobutanol, distiller's grains, iDGs or ethanol. Losses from hedging activities and changes in hedging strategy could have a material adverse effect on our operations.

Ethical, legal and social concerns about genetically engineered products and processes, and similar concerns about feedstocks grown on land that could be used for food production, could limit or prevent the use of our products, processes and technologies and limit our revenues.

Some of our processes involve the use of genetically engineered organisms or genetic engineering technologies. Additionally, our feedstocks may be grown on land that could be used for food production, which subjects our feedstock sources to "food versus fuel" concerns. If we are not able to overcome the ethical, legal and social concerns relating to genetic engineering or food versus fuel, our products and processes may not be accepted. Any of the risks discussed below could result in increased expenses, delays or other impediments to our programs or the public acceptance and commercialization of products and processes dependent on our technologies or inventions.

Our ability to develop and commercialize one or more of our technologies, products, or processes could be limited by the following factors:

public attitudes about the safety and environmental hazards of, and ethical concerns over, genetic research and genetically engineered products and processes, which could influence public acceptance of our technologies, products and processes;

public attitudes regarding and potential changes to laws governing ownership of genetic material, which could harm our intellectual property rights with respect to our genetic material and discourage others from supporting, developing or commercializing our products, processes and technologies;

public attitudes and ethical concerns surrounding production of feedstocks on land which could be used to grow food, which could influence public acceptance of our technologies, products and processes;

governmental reaction to negative publicity concerning genetically engineered organisms, which could result in greater government regulation of genetic research and derivative products; and

governmental reaction to negative publicity concerning feedstocks produced on land which could be used to grow food, which could result in greater government regulation of feedstock sources.

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The subjects of genetically engineered organisms and food versus fuel have received negative publicity, which has aroused public debate. This adverse publicity could lead to greater regulation and trade restrictions on imports of genetically engineered products or feedstocks grown on land suitable for food production.

The biocatalysts that we develop have significantly enhanced characteristics compared to those found in naturally occurring enzymes or microbes. While we produce our biocatalysts only for use in a controlled industrial environment, the release of such biocatalysts into uncontrolled environments could have unintended consequences. Any adverse effect resulting from such a release could have a material adverse effect on our business and financial condition, and we may be exposed to liability for any resulting harm.

As isobutanol has not previously been used as a commercial fuel in significant amounts, its use subjects us to product liability risks.

Isobutanol has not been used as a commercial fuel in large quantities or for a long period of time. Research regarding isobutanol and its distribution infrastructure is ongoing. Although isobutanol has been tested on some engines, there is a risk that it may damage engines or otherwise fail to perform as expected. If isobutanol degrades the performance or reduces the lifecycle of engines, or causes them to fail to meet emissions standards, market acceptance could be slowed or stopped, and we could be subject to product liability claims. A significant product liability lawsuit could substantially impair our production efforts and could have a material adverse effect on our business, reputation, financial condition and results of operations.

We may not be able to use some or all of our net operating loss carry-forwards to offset future income.

We have net operating loss carryforwards due to prior period losses generated before January 1, 2019, which if not utilized will begin to expire at various times over the next 20 years. If we are unable to generate sufficient taxable income to utilize our net operating loss carryforwards, these carryforwards could expire unused and be unavailable to offset future income tax liabilities.

In addition, under Section 382 of the Internal Revenue Code of 1986, as amended, a corporation that undergoes an “ownership change” (generally defined as a greater than 50% change (by value) in its equity ownership over a three-year period) is subject to limitation on its ability to utilize its pre-change net operating loss carry-forwards, or net operating losses, to offset future taxable income. We may have experienced one or more ownership changes in prior years, and the issuance of shares in connection with our initial public offering may itself have triggered an ownership change. In addition, future changes in our stock ownership, which may be outside of our control, may trigger an ownership change, as may future equity offerings or acquisitions that have equity as a component of the purchase price. If an ownership change has occurred or does occur in the future, our ability to utilize our net operating losses to offset income if we attain profitability may be limited.

If we fail to maintain an effective system of internal controls, we might not be able to report our financial results accurately or prevent fraud; in that case, our stockholders could lose confidence in our financial reporting, which would harm our business and could negatively impact the price of our stock.

Effective internal controls are necessary for us to provide reliable financial reports and prevent fraud. In addition, Section 404 of the Sarbanes-Oxley Act of 2002 ("Section 404") requires us to evaluate and report on our internal control over financial reporting and have our principal executive officer and principal financial officer certify as to the accuracy and completeness of our financial reports. The process of maintaining our internal controls and complying with Section 404 is expensive and time consuming, and requires significant attention of management. We cannot be certain that these measures will ensure that we maintain adequate controls over our financial processes and reporting in the future. Even if we conclude that our internal control over financial reporting provides reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles, because of their inherent limitations, our internal controls over financial reporting may not prevent or detect fraud or misstatements. Failure to maintain required controls or implement new or additional controls as circumstances warrant, or difficulties encountered in maintaining or implementing controls, could harm our results of operations or cause us to fail to meet our reporting obligations.

Our management has concluded that there are no material weaknesses in our internal controls over financial reporting as of December 31, 2018. However, there can be no assurance that our controls over financial processes and reporting will be effective in the future or that additional material weaknesses or significant deficiencies in our internal controls will not be discovered in the future. If we, or our independent registered public accounting firm, discover a material weakness, the disclosure of that fact, even if quickly remedied, could reduce the market's confidence in our financial statements and harm our stock price. In addition, a delay in compliance with Section 404 could subject us to a variety of administrative sanctions, including SEC action, ineligibility for short form resale registration, the suspension or delisting of our common stock from the stock exchange on which it is listed and the inability of registered broker-dealers to make a market in our common stock, which would further reduce our stock price and could harm our business.

We may enter into letters of intent, memoranda of understanding and other largely non-binding agreements with potential customers or partners that may not result in legally binding, definitive agreements.

From time to time, we may enter into letters of intent, memoranda of understanding and other largely non-binding agreements or understandings with potential customers or partners in order to develop our business and the markets that we serve. We can make no assurance that legally binding, definitive agreements reflecting the terms of such non-binding agreements will be completed with such customers or partners, or at all.

Competitiveness of our products for fuel use in the U.S. depends in part on the United States Renewable Fuel Standard Program or RFS Program at the federal level, and the benefits to our products derived from the RFS Program could change.

The RFS Program and policy are currently being discussed by policy makers. The RFS Program and policy could change impacting the RIN benefits our products could receive, making our products less competitive to the incumbent products made from petroleum.

We may not qualify for significant carbon value benefit in those states, regions, and countries where renewable carbon value in fuel products is being assigned.

The possibility exists that our products may not qualify for benefits of the Low Carbon Fuel Standard Program (LCFS) in California or similar programs in other states and countries. Failure of our products to qualify for LCFS or other similar programs could have a material adverse effect on our business.

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Risks Related to Intellectual Property

Our ability to compete may be adversely affected if we are unsuccessful in defending against any claims by competitors or others that we are infringing upon their intellectual property rights.

The various bioindustrial markets in which we plan to operate are subject to frequent and extensive litigation regarding patents and other intellectual property rights. In addition, many companies in intellectual property-dependent industries, including the renewable energy industry, have employed intellectual property litigation as a means to gain an advantage over their competitors. As a result, we may be required to defend against claims of intellectual property infringement that may be asserted by our competitors against us and, if the outcome of any such litigation is adverse to us, it may affect our ability to compete effectively.

Litigation, interferences, opposition proceedings or other intellectual property proceedings inside and outside of the U.S. may divert management time from focusing on business operations, could cause us to spend significant amounts of money and may have no guarantee of success. Any future intellectual property litigation could also force us to do one or more of the following:

- stop selling, incorporating, manufacturing or using our products that use the subject intellectual property;
- obtain from a third party asserting its intellectual property rights, a license to sell or use the relevant technology, which license may not be available on reasonable terms, or at all;
- redesign those products or processes, such as our processes for producing ethanol and isobutanol, that use any allegedly infringing or misappropriated technology, which may result in significant cost or delay to us, or which redesign could be technically infeasible;
- pay attorneys' fees and expenses; or
- pay damages, including the possibility of treble damages in a patent case if a court finds us to have willfully infringed certain intellectual property rights.

We are aware of a significant number of patents and patent applications relating to aspects of our technologies filed by, and issued to, third parties. We cannot assure you that we will ultimately prevail if any of this third-party intellectual property is asserted against us.

Our ability to compete may be adversely affected if we do not adequately protect our proprietary technologies or if we lose some of our intellectual property rights through costly litigation or administrative proceedings.

Our success will depend in part on our ability to obtain patents and maintain adequate protection of our intellectual property covering our technologies and products and potential products in the U.S. and other countries. We have adopted a strategy of seeking patent protection in the U.S. and in certain foreign countries with respect to certain of

the technologies used in or relating to our products and processes. We own rights to hundreds of issued patents and filed patent applications in the U.S. and in various foreign jurisdictions. When and if issued, patents would expire at the end of their term and any patent would only provide us commercial advantage for a limited period of time, if at all. Our patent applications are directed to our enabling technologies and to our methods and products which support our business in the advanced biofuels and renewable chemicals markets. We intend to continue to apply for patents relating to our technologies, methods and products as we deem appropriate.

Only some of the patent applications that we have filed in the U.S. or in any foreign jurisdictions, and only certain of the patent applications filed by third parties in which we own rights, have been issued. A filed patent application does not guarantee a patent will issue and a patent issuing does not guarantee its validity, nor does it give us the right to practice the patented technology or commercialize the patented product. Third parties may have or obtain rights to "blocking patents" that could be used to prevent us from commercializing our products or practicing our technology. The scope and validity of patents and success in prosecuting patent applications involve complex legal and factual questions and, therefore, issuance, coverage and validity cannot be predicted with any certainty. Patents issuing from our filed applications may be challenged, invalidated or circumvented. Moreover, third parties could practice our inventions in secret and in territories where we do not have patent protection. Such third parties may then try to sell or import products made using our inventions in and into the U.S. or other territories and we may be unable to prove that such products were made using our inventions. Additional uncertainty may result from implementation of the Leahy-Smith America Invents Act, enacted in September 2011, as well as other potential patent reform legislation passed by the U.S. Congress and from legal precedent handed down by the Federal Circuit Court and the U.S. Supreme Court, as they determine legal issues concerning the scope, validity and construction of patent claims. Because patent applications in the U.S. and many foreign jurisdictions are typically not published until 18 months after filing, or in some cases not at all, and because publication of discoveries in the scientific literature often lags behind the actual discoveries, there is additional uncertainty as to the validity of any patents that may issue and the potential for "blocking patents" coming into force at some future date. Accordingly, we cannot ensure that any of our currently filed or future patent applications will result in issued patents, or even if issued, predict the scope of the claims that may issue in our and other companies' patents. Any proceedings challenging our patents may result in the claims being amended or canceled. If the claims are amended or canceled, the scope of our patent claims may be narrowed, which may reduce the scope of protection afforded by our patent portfolio. Given that the degree of future protection for our proprietary rights is uncertain, we cannot ensure that (i) we were the first to make the inventions covered by each of our filed applications, (ii) we were the first to file patent applications for these inventions, (iii) the proprietary technologies we develop will be patentable, (iv) any patents issued will be broad enough in scope to provide commercial advantage and prevent circumvention, and (v) competitors and other parties do not have or will not obtain patent protection that will block our development and commercialization activities.

These concerns apply equally to patents we have licensed, which may likewise be challenged, invalidated or circumvented, and the licensed technologies may be obstructed from commercialization by competitors' "blocking patents." In addition, we generally do not control the patent prosecution and maintenance of subject matter that we license from others. Generally, the licensors are primarily or wholly responsible for the patent prosecution and maintenance activities pertaining to the patent applications and patents we license, while we may only be afforded opportunities to comment on such activities. Accordingly, we are unable to exercise the same degree of control over licensed intellectual property as we exercise over our own intellectual property and we face the risk that our licensors will not prosecute or maintain it as effectively as we would like.

In addition, unauthorized parties may attempt to copy or otherwise obtain and use our products or technology. Monitoring unauthorized use of our intellectual property is difficult, particularly where, as here, the end products reaching the market generally do not reveal the processes used in their manufacture, and particularly in certain foreign countries where the local laws may not protect our proprietary rights as fully as in the U.S., so we cannot be certain that the steps we have taken in obtaining intellectual property and other proprietary rights will prevent unauthorized use of our technology. If competitors are able to use our technology without our authorization, our ability to compete effectively could be adversely affected. Moreover, competitors and other parties such as universities may independently develop and obtain patents for technologies that are similar to or superior to our technologies. If that happens, the potential competitive advantages provided by our intellectual property may be adversely affected. We may then need to license these competing technologies, and we may not be able to obtain licenses on reasonable terms, if at all, which could cause material harm to our business. Accordingly, litigation may be necessary for us to assert claims of infringement, enforce patents we own or license, protect trade secrets or determine the enforceability, scope and validity of the intellectual property rights of others.

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Our commercial success also depends in part on not infringing patents and proprietary rights of third parties, and not breaching any licenses or other agreements that we have entered into with regard to our technologies, products and business. We cannot be certain that patents have not or will not issue to third parties that could block our ability to obtain patents or to operate our business as we would like, or at all. There may be patents in some countries that, if valid, may block our ability to commercialize products in those countries if we are unsuccessful in circumventing or acquiring rights to these patents. There may also be claims in patent applications filed in some countries that, if granted and valid, may also block our ability to commercialize products or processes in these countries if we are unable to circumvent or license them.

As is commonplace in the biotechnology industries, some of our directors, employees and consultants are or have been employed at, or associated with, companies and universities that compete with us or have or will develop similar technologies and related intellectual property. While employed at these companies, these employees, directors and consultants may have been exposed to or involved in research and technology similar to the areas of research and technology in which we are engaged. Though we have not received such a complaint, we may be subject to allegations that we, our directors, employees or consultants have inadvertently or otherwise used, misappropriated or disclosed alleged trade secrets or confidential or proprietary information of those companies. Litigation may be necessary to defend against such allegations and the outcome of any such litigation would be uncertain.

Under some of our research agreements, our partners share joint rights in certain intellectual property we develop. Such provisions may limit our ability to gain commercial benefit from some of the intellectual property we develop, and may lead to costly or time-consuming disputes with parties with whom we have commercial relationships over rights to certain innovations.

If any other party has filed patent applications or obtained patents that claim inventions also claimed by us, we may have to participate in interference, derivation or other proceedings declared by the USPTO to determine priority of invention and, thus, the right to the patents for these inventions in the U.S. These proceedings could result in substantial cost to us even if the outcome is favorable. Even if successful, such a proceeding may result in the loss of certain claims. Even successful outcomes of such proceedings could result in significant legal fees and other expenses, diversion of management time and efforts and disruption in our business. Uncertainties resulting from initiation and continuation of any patent or related litigation could harm our ability to compete.

If our biocatalysts, or the genes that code for our biocatalysts, are stolen, misappropriated or reverse engineered, others could use these biocatalysts or genes to produce competing products.

Third parties, including our contract manufacturers, customers and those involved in shipping our biocatalysts, may have custody or control of our biocatalysts. If our biocatalysts, or the genes that code for our biocatalysts, were stolen, misappropriated or reverse engineered, they could be used by other parties who may be able to reproduce these biocatalysts for their own commercial gain. If this were to occur, it would be difficult for us to discover or challenge

this type of use, especially in countries with limited intellectual property protection.

During the ordinary course of business, we may become subject to lawsuits or indemnity claims, which could materially and adversely affect our business and results of operations.

From time to time, we may in the ordinary course of business be named as a defendant in lawsuits, claims and other legal proceedings. These actions may seek, among other things, compensation for alleged personal injury, worker's compensation, employment discrimination, breach of contract, property damages, civil penalties and other losses of injunctive or declaratory relief. In the event that such actions or indemnities are ultimately resolved unfavorably at amounts exceeding our accrued liability, or at material amounts, the outcome could materially and adversely affect our reputation, business and results of operations. In addition, payments of significant amounts, even if reserved, could adversely affect our liquidity position.

We may not be able to enforce our intellectual property rights throughout the world.

The laws of some foreign countries do not protect intellectual property rights to the same extent as federal and state laws in the U.S. Many companies have encountered significant problems in protecting and enforcing intellectual property rights in certain foreign jurisdictions, and, particularly as we move forward in our partnerships with Porta, Praj, and future international partners, we may face new and increased risks and challenges in protecting and enforcing our intellectual property rights abroad. The legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents and other intellectual property protection, particularly those relating to bioindustrial technologies. This could make it difficult for us to stop the infringement of our patents or misappropriation of our other intellectual property rights. Proceedings to enforce our patents and other proprietary rights in foreign jurisdictions could result in substantial costs and divert our efforts and attention from other aspects of our business. Accordingly, our efforts to enforce our intellectual property rights in such countries may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop.

Confidentiality agreements with employees and others may not adequately prevent disclosures of trade secrets and other proprietary information.

We rely in part on trade secret protection to protect our confidential and proprietary information and processes. However, trade secrets are difficult to protect. We have taken measures to protect our trade secrets and proprietary information, but these measures may not be effective. We require new employees and consultants to execute confidentiality agreements upon the commencement of an employment or consulting arrangement with us. These agreements generally require that all confidential information developed by the individual or made known to the individual by us during the course of the individual's relationship with us be kept confidential and not disclosed to third parties. These agreements also generally provide that know-how and inventions conceived by the individual in the course of rendering services to us shall be our exclusive property. Nevertheless, these agreements may not be enforceable, our proprietary information may be disclosed, third parties could reverse engineer our biocatalysts and

others may independently develop substantially equivalent proprietary information and techniques or otherwise gain access to our trade secrets. Costly and time-consuming litigation could be necessary to enforce and determine the scope of our proprietary rights, and failure to obtain or maintain trade secret protection could adversely affect our competitive business position. In addition, an unauthorized breach in our information technology systems may expose our trade secrets and other proprietary information to unauthorized parties.

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We have received funding from U.S. government agencies, which could negatively affect our intellectual property rights.

Some of our research has been funded by grants from U.S. government agencies. When new technologies are developed with U.S. government funding, the government obtains certain rights in any resulting patents and technical data, generally including, at a minimum, a nonexclusive license authorizing the government to use the invention or technical data for noncommercial purposes. U.S. government funding must be disclosed in any resulting patent applications, and our rights in such inventions will normally be subject to government license rights, periodic progress reporting, foreign manufacturing restrictions and march-in rights. March-in rights refer to the right of the U.S. government, under certain limited circumstances, to require us to grant a license to technology developed under a government grant to a responsible applicant or, if we refuse, to grant such a license itself. March-in rights can be triggered if the government determines that we have failed to work sufficiently towards achieving practical application of a technology or if action is necessary to alleviate health or safety needs, to meet requirements of federal regulations or to give preference to U.S. industry. If we breach the terms of our grants, the government may gain rights to the intellectual property developed in our related research. The government's rights in our intellectual property may lessen its commercial value, which could adversely affect our performance.

Risks Related to Legal and Regulatory

Any decline in the value of carbon credits associated with our products could have a material adverse effect on our results of operations, cash flow and financial condition.

The sale of our products is often dependent on the value of carbon credits under the RFS, LCFS and other similar regulatory regimes. The value of these credits fluctuates based on market forces outside of our control. There is a risk that the supply of low-carbon alternative fuels outstrips demand, resulting in the value of carbon credits declining. Any such declines could mean that the economic benefits from our efforts to de-carbonize the Luverne Facility might not be realized. Any decline in the value of carbon credits associated with our products could have a material adverse effect on our results of operations, cash flow and financial condition.

The United States ethanol industry is highly dependent upon certain federal and state legislation and regulation and any changes in legislation or regulation could have a material adverse effect on our results of operations, cash flows and financial condition.

The EPA has implemented the RFS pursuant to the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007. The RFS program sets annual quotas for the quantity of renewable fuels (such as ethanol) that must be blended into motor fuels consumed in the United States. The domestic market for ethanol is significantly

impacted by federal mandates under the RFS program for volumes of renewable fuels (such as ethanol) required to be blended with gasoline. Future demand for ethanol will be largely dependent upon incentives to blend ethanol into motor fuels, including the price of ethanol relative to the price of gasoline, the relative octane value of ethanol, constraints in the ability of vehicles to use higher ethanol blends, the RFS, and other applicable environmental requirements. Any significant increase in production capacity above the RFS minimum requirements may have an adverse impact on ethanol prices.

We may face substantial delays in obtaining regulatory approvals for use of our isobutanol and hydrocarbon products in the fuels and chemicals markets, which could substantially hinder our ability to commercialize our products.

Large-scale commercialization of our isobutanol may require approvals from state and federal agencies. Before we can sell isobutanol as a fuel or as a gasoline blendstock directly to large petroleum refiners, we must receive EPA fuel certification. On June 12, 2018, the EPA announced that it approved the registration of isobutanol as a fuel additive for blending into gasoline at levels up to 16 volume percent for on-road automotive use. There can be no assurances that the EPA registration of isobutanol as a fuel additive for blending into gasoline at levels up to 16 volume percent will not be revoked or changed. Nor does approval by the EPA of 16 volume percent blends mitigate other rules that may exist that have to be overcome for main market adoption (rather than a specialty market) regarding blending of isobutanol in gasoline. For example the issue of Product Transfer Documents for Blendstock for Oxygenate Blending in common blending tanks served by multiple suppliers, needing to be labeled to accept isobutanol.

Additionally, California requires that fuels meet both its fuel certification requirements and a separate state low-carbon fuel standard. Any delay in receiving approval will slow or prevent the commercialization of our low-carbon ethanol or isobutanol for fuel markets, which could have a material adverse effect on our business, financial condition and results of operations.

With respect to the chemicals markets, we plan to focus on isobutanol production and sell to companies that can convert our isobutanol into other chemicals, such as isobutylene. However, should we later decide to produce these other chemicals ourselves, we may face similar requirements for EPA and other regulatory approvals. Approval, if ever granted, could be delayed for substantial amounts of time, which could significantly harm the development of our business and prevent the achievement of our goals.

Our isobutanol fermentation process utilizes a genetically modified organism which, when used in an industrial process, is considered a new chemical under the EPA's Toxic Substances Control Act ("TSCA"). The TSCA requires us to comply with the EPA's Microbial Commercial Activity Notice process to operate plants producing isobutanol using our biocatalysts. The TSCA's new chemicals submission policies may change and additional government regulations may be enacted that could prevent or delay regulatory approval of our isobutanol production.

There are various third-party certification organizations, such as ASTM and Underwriters' Laboratories, Inc., involved in standard-setting regarding the transportation, dispensing and use of liquid fuel in the U.S. and abroad. These organizations may change the current standards and additional requirements may be enacted that could prevent or

delay approval of our products. The process of seeking required approvals and the continuing need for compliance with applicable standards may require the expenditure of substantial resources, and there is no guarantee that we will satisfy these standards in a timely manner, if ever.

In addition, to Retrofit or otherwise modify ethanol facilities and operate the Retrofitted and modified plants to produce isobutanol, we will need to obtain and comply with a number of permit requirements. As a condition to granting necessary permits, regulators may make demands that could increase our Retrofit, modification or operations costs, and permit conditions could also restrict or limit the extent of our operations, which could delay or prevent our commercial production of isobutanol. We cannot guarantee that we will be able to meet all regulatory requirements or obtain and comply with all necessary permits to complete our planned ethanol plant Retrofits, and failure to satisfy these requirements in a timely manner, or at all, could have a substantial negative effect on our performance.

Jet fuels must meet various statutory and regulatory requirements before they may be used in commercial aviation, including regulations of the Federal Aviation Administration (“FAA”) and specifications determined by ASTM International. Currently, our renewable jet fuel meets the FAA regulations and the ASTM International specifications. However, changes to applicable regulations and specifications.in the future might have a material adverse effect on our business if such changes resulted in our renewable jet fuel not being eligible for use in commercial aviation.

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Our isobutanol and hydrocarbon products may encounter physical or regulatory issues, which could limit its usefulness as a gasoline blendstock.

In the gasoline blendstock market, isobutanol can be used in conjunction with, or as a substitute for, ethanol and other widely used fuel oxygenates, and we believe our isobutanol is physically compatible with typical gasoline engines. However, there is a risk that under actual engine conditions, isobutanol will face significant limitations, making it unsuitable for use in high percentage gasoline blends. Additionally, current regulations limit gasoline blends to low percentages of isobutanol, and also limit combination isobutanol-ethanol blends. On June 12, 2018, the EPA announced that it approved the registration of isobutanol as a fuel additive for blending into gasoline at levels up to 16 volume percent for on-road automotive use. There can be no assurances that the EPA registration of isobutanol as a fuel additive for blending into gasoline at levels up to 16 volume percent will not be revoked or changed. Government agencies may maintain or even increase the restrictions on isobutanol gasoline blends. As we believe that the potential to use isobutanol in higher percentage blends than is feasible for ethanol will be an important factor in successfully marketing isobutanol to refiners, a low blend wall could significantly limit commercialization of isobutanol as a gasoline blendstock.

We may be required to obtain additional regulatory approvals for use of our iDGs as animal feed, which could delay our ability to sell iDGs increasing our net cost of production and harming our operating results.

Our Luverne Facility and many of the ethanol plants that we might Retrofit use dry-milled corn as a feedstock. We plan to sell, as animal feed, the iDGs left as a co-product of fermenting isobutanol from dry-milled corn. We believe that this will enable us to offset a significant portion of the expense of purchasing corn for fermentation. We are currently approved to sell iDGs as animal feed through the self-assessed Generally Regarded as Safe (“GRAS”) process of the U.S. Federal Drug Administration (the “FDA”) via third party scientific review. In order to improve the value of our iDGs, we are working with The Association of American Feed Control Officials (“AAFCO”) to establish a formal definition for our iDGs as well as clearance for the materials into animal feed. We believe obtaining AAFCO approval will increase the value of our iDGs by offering customers of our iDGs further assurance of the safety of our iDGs. If we make certain changes in our biocatalyst whereby we can no longer rely on our GRAS process, we would be required to obtain FDA approval for marketing our iDGs. While we believe we can rely on the GRAS process, as we update our biocatalysts to increase isobutanol production, for further customer assurance, we also intend to pursue approval upon a completed biocatalyst from the Center for Veterinary Medicine of the FDA. FDA testing and approval can take a significant amount of time, and there is no guarantee that we will ever receive such approval. While we have sold initial quantities of our iDGs TM from the Luverne Facility, if FDA or AAFCO approval is delayed or never obtained, or if we are unable to secure market acceptance for our iDGs, our net cost of production will increase, which may hurt our operating results.

Reductions or changes to existing regulations and policies may present technical, regulatory and economic barriers, all of which may significantly reduce demand for biofuels or our ability to supply isobutanol.

The market for biofuels is heavily influenced by foreign, federal, state and local government laws, regulations and policies. Changes in these laws, regulations and policies or how these laws, regulations and policies are implemented and enforced could cause the demand for biofuels to decline and deter investment in the research and development of biofuels.

Concerns associated with biofuels, including land usage, national security interests and food crop usage, continue to receive legislative, industry and public attention. This attention could result in future legislation, regulation and/or administrative action that could adversely affect our business. Any inability to address these requirements and any regulatory or policy changes could have a material adverse effect on our business, financial condition and results of operations.

Additionally, like the ethanol facilities that we Retrofit, our isobutanol plants will emit greenhouse gases. Any changes in state or federal emissions regulations, including the passage of cap-and-trade legislation or a carbon tax, could limit our production of isobutanol and iDGs and increase our operating costs, which could have a material adverse effect on our business, financial condition and results of operations. The results of U.S. elections could lead to changes in federal or state laws and regulations that could have a material adverse effect on our business, prospects, financial condition and results of operations.

We use hazardous materials in our business and we must comply with environmental laws and regulations. Any claims relating to improper handling, storage or disposal of these materials or noncompliance with applicable laws and regulations could be time consuming and costly and could adversely affect our business and results of operations.

Our research and development processes involve the use of hazardous materials, including chemical, radioactive and biological materials. Our operations also produce hazardous waste. We cannot eliminate entirely the risk of accidental contamination or discharge and any resultant injury from these materials. Federal, state and local laws and regulations govern the use, manufacture, storage, handling and disposal of, and human exposure to, these materials. We may be sued for any injury or contamination that results from our use or the use by third parties of these materials, and our liability may exceed our total assets. Although we believe that our activities conform in all material respects with environmental laws, there can be no assurance that violations of environmental, health and safety laws will not occur in the future as a result of human error, accident, equipment failure or other causes. Compliance with applicable environmental laws and regulations may be expensive, and the failure to comply with past, present, or future laws could result in the imposition of fines, third-party property damage, product liability and personal injury claims, investigation and remediation costs, the suspension of production or a cessation of operations, and our liability may exceed our total assets. Liability under environmental laws can be joint and several and without regard to comparative fault. Environmental laws could become more stringent over time imposing greater compliance costs and increasing risks and penalties associated with violations, which could impair our research, development or production efforts and harm our business.

Our expanded international activities may increase our exposure to potential liability under anti-corruption, trade protection, tax and other laws and regulations.

In the course of our relationships with Praj, Porta and future international partners, we may become subject to certain foreign tax, environmental, and health and safety regulations that did not previously apply to us or our products. Such regulations may be unclear, not consistently applied and subject to sudden change. Implementation of compliance policies could result in additional operating costs, and our failure to comply with such laws, even inadvertently, could result in significant fines and/or penalties.

Additionally, the Foreign Corrupt Practices Act and other anti-corruption laws and regulations ("Anti-Corruption Laws") prohibit corrupt payments by our employees, vendors or agents. Even with implementation of policies, training and internal controls designed to reduce the risk of corrupt payments, our employees, vendors or agents may violate our policies. Our international partnerships may significantly increase our exposure to potential liability. Our failure to comply with Anti-Corruption Laws could result in significant fines and penalties, criminal sanctions against us, our officers or our employees, prohibitions on the conduct of our business, and damage to our reputation.`

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Risks Related to Owning Our Securities

The market price of our common stock may be adversely affected by the future issuance and sale of additional shares of our common stock or by our announcement that such issuances and sales may occur.

We cannot predict the size of future issuances or sales of shares of our common stock in connection with future acquisitions or capital raising activities, or the effect, if any, that such issuances or sales may have on the market price of our common stock. The issuance and sale of substantial amounts of shares of our common stock or the announcement that such issuances and sales may occur, could adversely affect the market price of our common stock.

We may not be permitted by the agreements governing our indebtedness, including our secured indebtedness with Whitebox, to repurchase our warrants and we may not have the ability to do so.

Under certain circumstances, if a “fundamental transaction” or “extraordinary transaction” (as such terms are defined in our various warrants) occurs, holders of our warrants may require us to repurchase, for cash, the remaining unexercised portion of such warrants for an amount of cash equal to the value of the warrant as determined in accordance with the Black Scholes option pricing model and the terms of our warrants. Our ability to repurchase our warrants depends on our ability to generate cash flow in the future. To some extent, this is subject to general economic, financial, competitive, legislative and regulatory factors and other factors that are beyond our control. We cannot assure you that we will maintain sufficient cash reserves or that our business will generate cash flow from operations at levels sufficient to permit us to repurchase our warrants. In addition, any such repurchase of our warrants may result in a default under the agreements governing our indebtedness, including our secured indebtedness with Whitebox, unless we are able to obtain such lender’s consent prior to the taking of such action. If we were unable to obtain such consent, compliance with the terms of our warrants would trigger an event of default under such agreements.

Future issuances of our common stock or instruments convertible or exercisable into our common stock, including in connection with conversions of our 2020 Notes or exercises of warrants, may materially and adversely affect the price of our common stock and cause dilution to our existing stockholders.

In order to fund our business over the past few years, we have raised capital by issuing common stock and warrants in underwritten public offerings because no other reasonable sources of capital were available. These underwritten public offerings of common stock and warrants have materially and adversely affected the prevailing market prices of our common stock and caused significant dilution to our stockholders. We anticipate that for the foreseeable future we will continue to raise capital through these dilutive public offerings of common stock and warrants.

We may obtain additional funds through public or private debt or equity financings in the near future, subject to certain limitations in the agreements governing our indebtedness, including the 2020 Notes. If we issue additional shares of common stock or instruments convertible into common stock, it may materially and adversely affect the price of our common stock. In addition, the conversion of some or all of the 2020 Notes and/or the exercise of some or all of the warrants may dilute the ownership interests of our stockholders, and any sales in the public market of any of our common stock issuable upon such conversion or exercise could adversely affect prevailing market prices of our common stock. Additionally, under the terms of certain warrants in the event that a warrant is exercised at a time when we do not have an effective registration statement covering the underlying shares of common stock on file with the SEC, such warrant may be net exercised, which will dilute the ownership interests of existing stockholders without any corresponding benefit to the Company of a cash payment for the exercise price of such warrant.

As of December 31, 2018, we had approximately $13.8 million in outstanding 2020 Notes, which were convertible into 1,071,674 shares of our common stock (after giving effect to the Reverse Stock Split) at the conversion rate in effect on December 31, 2018. The 1,071,674 shares includes 135,714 shares of common stock (in each case, after giving effect to the Reverse Stock Split) that may be issuable from time to time in the event that we pay a portion of the interest on the 2020 Notes in kind or elect to pay make-whole payments due upon conversion of the 2020 Notes, if any, in shares of common stock. The anticipated conversion of the outstanding 2020 Notes (including any interest that is paid in kind) into shares of our common stock could depress the trading price of our common stock. In addition, subject to certain restrictions, we have the option to issue common stock to any converting holder in lieu of making any required make-whole payment in cash. If we elect to issue our common stock for such payment, it will be at the same conversion rate that is applicable to conversions of the principal amount of the 2020 Notes. If we elect to issue additional shares of our common stock for such payments, this may cause significant additional dilution to our existing stockholders.

Our stock price may be volatile, and your investment in our securities could suffer a decline in value.

The market price of shares of our common stock has experienced significant price and volume fluctuations. We cannot predict whether the price of our common stock will rise or fall. A variety of factors may have a significant effect on our stock price, including:

- actual or anticipated fluctuations in our liquidity, financial condition and operating results;
- the position of our cash and cash equivalents;
- actual or anticipated changes in our growth rate relative to our competitors;
- actual or anticipated fluctuations in our competitors' operating results or changes in their growth rate;
- announcements of technological innovations by us, our partners or our competitors;
- announcements by us, our partners or our competitors of significant acquisitions, strategic partnerships, joint ventures or capital commitments;
- the entry into, modification or termination of licensing arrangements, marketing arrangements, and/or research, development, commercialization, supply, off-take or distribution arrangements;

our ability to consistently produce commercial quantities of ethanol and isobutanol at the Luverne Facility and ramp up production to nameplate capacity;
our ability to repay our indebtedness when it becomes due;
our ability to refinance, restructure or convert our current and future indebtedness;
additions or losses of customers or partners;
our ability to obtain certain regulatory approvals for the use of our ethanol and isobutanol in various fuels and chemicals markets;
commodity prices, including oil, ethanol and corn prices;
additions or departures of key management or scientific personnel;
competition from existing products or new products that may emerge;
issuance of new or updated research reports by securities or industry analysts;
fluctuations in the valuation of companies perceived by investors to be comparable to us;
litigation involving us, our general industry or both;
disputes or other developments related to proprietary rights, including patents, litigation matters and our ability to obtain patent protection for our technologies;
announcements or expectations of additional financing efforts or the pursuit of strategic alternatives;

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- changes in existing laws, regulations and policies applicable to our business and products, including the Renewable Fuel Standard program, and the adoption of or failure to adopt carbon emissions regulation;
- sales of our common stock or equity-linked securities, such as warrants, by us or our stockholders;
- share price and volume fluctuations attributable to inconsistent trading volume levels of our shares;
- general market conditions in our industry; and
- general economic and market conditions.

Furthermore, the stock markets have experienced extreme price and volume fluctuations that have affected and continue to affect the market prices of equity securities of many companies. These fluctuations often have been unrelated or disproportionate to the operating performance of those companies. These broad market and industry fluctuations, as well as general economic, political and market conditions such as recessions, interest rate changes or international currency fluctuations, may negatively impact the market price of shares of our common stock, regardless of our operating performance, and cause the value of your investment to decline. Because our 2020 Notes are convertible into our common stock and our warrants are exercisable into our common stock, volatility or a reduction in the market price of our common stock could have an adverse effect on the trading price of our 2020 Notes and our warrants. Holders who receive common stock upon exercise of our warrants will also be subject to the risk of volatility and a reduction in the market price of our common stock.

In addition, significant amounts of short selling, or the perception that a significant amount of short sales could occur, could depress the market price of our common stock and could cause material changes to the volume of our common stock traded on Nasdaq. “Short selling” is the sale of a security that the seller does not own, including a sale that is completed by the seller's delivery of a “borrowed” security (i.e. the short seller's promise to deliver the security).

Additionally, in the past, companies that have experienced volatility in the market price of their stock have been subject to securities class action litigation or other derivative shareholder lawsuits. We may be the target of this type of litigation in the future. Securities litigation against us could result in substantial costs and divert our management’s attention from other business concerns, which could seriously harm our business regardless of the outcome.

The price of our common stock could also be affected by possible sales of common stock by investors who view our 2020 Notes or warrants as a more attractive means of equity participation in us and by hedging or engaging in arbitrage activity involving our common stock. The hedging or arbitrage could, in turn, affect the trading prices of our warrants, if any trading market becomes established, or any common stock that holders receive upon exercise of such warrants.

Sales of a substantial number of shares of our common stock or securities linked to our common stock, such as our 2020 Notes and warrants (should an established market for such securities then exist), in the public market could occur at any time. These sales, or the perception in the market that such sales may occur, could reduce the market price of our common stock.

In addition, certain holders of our outstanding common stock (including shares of our common stock issuable upon the conversion of certain 2020 Notes or upon exercise of certain outstanding warrants) have rights, subject to certain conditions, to require us to file registration statements covering their shares and to include their shares in registration statements that we may file for ourselves or other stockholders.

Our quarterly operating results may fluctuate in the future. As a result, we may fail to meet or exceed the expectations of investment research analysts or investors, which could cause our stock price to decline.

Our financial condition and operating results have varied significantly in the past and may continue to fluctuate from quarter to quarter and year to year in the future due to a variety of factors, many of which are beyond our control. Factors relating to our business that may contribute to these fluctuations are described in this Report and other reports that we have filed with the SEC. Accordingly, the results of any prior quarterly or annual periods should not be relied upon as indications of our future operating performance.

The indebtedness under our 2020 Notes are secured by substantially all of our assets. As a result of these security interests, such assets would only be available to satisfy claims of our general creditors or to holders of our equity securities if we were to become insolvent to the extent the value of such assets exceeded the amount of our indebtedness and other obligations.

Indebtedness under our 2020 Notes is secured by a first lien, on substantially all of our assets. Accordingly, if an event of default were to occur under our credit facilities, holders of our 2020 Notes would have a priority right to our assets, to the exclusion of our general creditors, in the event of our bankruptcy, insolvency, liquidation, or reorganization. In that event, our assets would first be used to repay in full all indebtedness and other obligations secured by them, resulting in all or a portion of our assets being unavailable to satisfy the claims of our unsecured indebtedness. Only after satisfying the claims of our unsecured creditors and our subsidiaries' unsecured creditors would any amount be available for distribution to holders of our equity securities.

The terms of the agreements governing our indebtedness, including the indenture governing our 2020 Notes, may restrict our ability to engage in certain transactions.

The terms of the agreements governing our indebtedness, including the indenture governing the 2020 Notes, may prohibit us from engaging in certain actions, including disposing of certain assets, granting or otherwise allowing the imposition of a lien against certain assets, incurring certain kinds of additional indebtedness, acquiring or merging with other entities, or making dividends and other restricted payments unless we receive the prior approval of the requisite lenders or the requisite holders of the 2020 Notes. If we are unable to obtain such approval, we could be prohibited from engaging in transactions which could be beneficial to our business and our stockholders or could be forced to repay such indebtedness in full.

The indenture governing the 2020 Notes may prohibit us from engaging in certain mergers or acquisitions and if a fundamental change of the Company occurs prior to the maturity date of the 2020 Notes, holders of the 2020 Notes will have the right, at their option, to require us to repurchase all or a portion of their 2020 Notes and, in certain circumstances, to pay the holders of the 2020 Notes a make-whole payment equal to the aggregate amount of interest that would have been payable on such 2020 Notes from the repurchase date through the maturity date of such 2020 Notes. With respect to the 2020 Notes, we have the right to increase the conversion rate of the 2020 Notes by any amount for a period of at least 20 business days if our board of directors determines that such increase would be in our best interest. In addition, if a fundamental transaction occurs, holders of some of our warrants will have the right, at their option, to require us to repurchase the unexercised portion of such warrants for an amount in cash equal to the value of such warrants, as determined in accordance with the Black Scholes option pricing model and the terms of such warrants. These and other provisions could prevent or deter a third party from acquiring us, even where the acquisition could be beneficial to you.

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The conversion or exercise prices, as applicable, of the 2020 Notes and warrants can fluctuate under certain circumstances which, if triggered, can result in potentially material further dilution to our stockholders.

The conversion price of the 2020 Notes can fluctuate in certain circumstances, including in the event that there is a dividend or distribution paid on shares of our common stock or a subdivision, combination or reclassification of our common stock. In such instances, the conversion price of the 2020 Notes can fluctuate materially lower than the current conversion price of $14.72 per share or 0.0679 shares per $1.00 of principal.

The number of shares of common stock for which certain of our warrants, are exercisable may be adjusted in the event that we undertake certain stock dividends, splits, combinations, distributions, and the price at which such shares of common stock may be purchased upon exercise of the warrants may be adjusted in the event that we undertake certain issuances of common stock or convertible securities at prices lower than the then-current exercise price for the warrants. As a result of these provisions, the exercise price of the warrants that we issued [August 2014, May 2015, December 2015, March 2016 and February 2017] may be subject to adjustment in connection with future offerings. These provisions could result in substantial dilution to investors in our common stock.

The interest rates of the 2020 Notes can fluctuate under certain circumstances which, if triggered, can result in potentially material further dilution to our stockholders.

The interest rates of the 2020 Notes can fluctuate in certain circumstances, including in the event of a default of our obligations under the indenture governing the 2020 Notes or the registration rights agreements, if any, entered into in connection with such notes. In addition, the interest on the 2020 Notes may be payable in-kind. As we may pay a portion of the interest on the 2020 Notes in kind, by either increasing the principal amount of the outstanding 2020 Notes or issuing additional 2020 Notes, any increase to the interest rate applicable to the 2020 Notes could result in additional dilution to investors in our common stock.

We may not have the ability to pay interest on the 2020 Notes, repurchase or redeem the 2020 Notes, if applicable, or repay the 2020 Notes at maturity.

If we elect to redeem the 2020 Notes prior to their maturity on March 15, 2020, the redemption price of any 2020 Notes redeemed by us will be paid for in cash. Our ability to pay the interest on the 2020 Notes, to repurchase or redeem the 2020 Notes, to refinance our indebtedness and to fund working capital needs and planned capital expenditures depends on our ability to generate cash flow in the future. To some extent, this is subject to general economic, financial, competitive, legislative and regulatory factors and other factors that are beyond our control. We cannot assure you that we will maintain sufficient cash reserves or that our business will generate cash flow from operations at levels sufficient to permit us to pay the interest on the 2020 Notes, to repurchase or redeem the 2020

Notes, to pay any cash amounts that may become due upon conversion of the 2020 Notes or repay the 2020 Notes at maturity, or that our cash needs will not increase. In addition, any such repurchase or redemption of the 2020 Notes, even if such action would be in our best interests, may result in a default under the agreements governing our indebtedness unless we are able to obtain the applicable lender's consent prior to the taking of such action.

Our failure to repurchase tendered 2020 Notes at a time when the repurchase is required by the indenture governing the 2020 Notes would constitute a default under such notes and would permit holders of such notes to accelerate our obligations under the 2020 Notes. Such default may also lead to a default under the agreements governing any of our current and future indebtedness. If the repayment of the related indebtedness were to be accelerated after any applicable notice or grace periods, we may not have sufficient funds to repay such indebtedness and repurchase the 2020 Notes or make cash payments upon conversions thereof.

If we are unable to generate sufficient cash flow from operations in the future to service our indebtedness and meet our other needs, we may have to refinance all or a portion of our indebtedness, obtain additional funds through public or private debt or equity financings, reduce expenditures or sell assets that we deem necessary to our business. Our ability to take some or all of these actions will be subject to certain limitations in the agreements governing our indebtedness, including the 2020 Notes, and we cannot assure you that any of these measures would be possible or that any additional financing could be obtained on favorable terms, or at all. The inability to obtain additional financing on commercially reasonable terms could have a material adverse effect on our financial condition, which could cause the value of your investment to decline. Additionally, if we were to conduct a public or private offering of securities, any new offering would be likely to dilute our stockholders' equity ownership.

If a fundamental change (as defined in the indenture governing the 2020 Notes) occurs, holders of the 2020 Notes may require us to repurchase, for cash, all or a portion of their 2020 Notes. In such circumstance we would be required to offer to repurchase the 2020 Notes at 100% of principal plus accrued and unpaid interest to, but not including, the repurchase date. We would also be required to pay the holders of the 2020 Notes a fundamental change make-whole payment equal to the aggregate amount of interest that would have otherwise been payable on such notes to, but not including, the maturity date of such notes.

Raising additional capital may cause dilution to our existing stockholders, restrict our operations or require us to relinquish rights to our technologies.

We may, subject to certain limitations in the agreements governing our indebtedness, including our secured indebtedness with Whitebox, seek additional capital through a combination of public and private equity offerings, debt financings, strategic partnerships and licensing arrangements. To the extent that we raise additional capital through the sale or issuance of equity, warrants or convertible debt securities, the ownership interest of our existing shareholders will be diluted, and the terms of such securities may include liquidation or other preferences that adversely affect your rights as a stockholder. If we raise capital through debt financing, it may involve agreements that include covenants further limiting or restricting our ability to take certain actions, such as incurring additional debt, making capital expenditures or declaring dividends. If we raise additional funds through strategic partnerships or licensing agreements with third parties, we may have to relinquish valuable rights to our technologies, or grant licenses on

terms that are not favorable to us. If we are unable to raise additional funds when needed, we may be required to delay, limit, reduce or terminate our development and commercialization efforts.

Our ability to raise capital may be limited by the Securities Act and SEC rules and regulations.

Under current SEC rules and regulations, if the aggregate market value of our common stock held by non-affiliates, or public float, falls to less than $75 million (calculated as set forth in Form S-3 and SEC rules and regulations) at the time of filing of our next Annual Report on Form 10- K, the amount we can raise through primary public offerings of our securities in any twelve-month period using a registration statement on Form S- 3 will be limited to one-third of our public float. Alternative means of raising capital through sales of our securities, including through the use of a "long form" registration statement on Form S-1 registration statement or in private placements of equity or debt securities, may be more costly and time-consuming and more difficult to market to potential investors, which may have a material adverse effect on our ability to raise capital, our liquidity position and strategy.

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The issuance of share-based payment awards under our stock incentive plan may cause dilution to our existing stockholders and may affect the market price of our common stock.

We have used, and in the future we may continue to use, stock options, stock grants and other equity-based incentives, either pursuant to 2010 Stock Incentive Plan (as amended and restated, the "2010 Plan"), or outside of the 2010 Plan, to provide motivation and compensation to our directors, officers, employees and key independent consultants. The award of any such incentives will result in an immediate and potentially substantial dilution to our existing shareholders and could result in a decline in the value of our stock price.

As of December 31, 2018, there were 813 shares subject to outstanding options that are or will become eligible for sale in the public market to the extent permitted by any applicable vesting requirements and Rules 144 and 701 under the Securities Act. The exercise of these options and the sale of the underlying shares of common stock and the sale of stock issued pursuant to stock grants may have an adverse effect upon the price of our common stock, which in turn may have an adverse effect upon the trading price of our warrants.

As of December 31, 2018, there were 2,630 shares of common stock available for future grant under our 2010 Plan and 190 shares of common stock reserved for issuance under our Employee Stock Purchase Plan. These shares can be freely sold in the public market upon issuance and once vested.

We may pay vendors in stock as consideration for their services; this may result in additional costs and may cause dilution to our existing stockholders.

In order for us to preserve our cash resources, we may in the future pay vendors, including technology partners, in shares, warrants or options to purchase shares of our common stock rather than cash. Payments for services in stock may materially and adversely affect our stockholders by diluting the value of outstanding shares of our common stock. In addition, in situations where we agree to register the shares issued to a vendor, this will generally cause us to incur additional expenses associated with such registration.

Except as set forth in the applicable warrant, holders of our warrants will have no rights as common stockholders until such holders exercise their warrants and acquire our common stock.

Until holders of our warrants acquire shares of our common stock upon exercise of their warrants, they will have no rights with respect to the shares of our common stock underlying such warrants, except for those rights set forth in the applicable warrant. Upon exercise of such warrants, such holders of our warrants will be entitled to exercise the rights

of a common stockholder only as to matters for which the record date occurs after the exercise date.

The exercise prices for our warrants will not be adjusted for all dilutive events.

The exercise prices of certain warrants are subject to adjustment for certain events, including the issuance of stock dividends on our common stock and, in certain instances, the issuance of our common stock at a price per share less than the exercise price of such warrants. However, the exercise prices will not be adjusted for other events, including the issuance of certain rights, options or warrants, distributions of capital stock, indebtedness, or assets and cash dividends. Accordingly, an event that adversely affects the value of the warrants may occur, and that event may not result in an adjustment to the exercise prices.

We do not anticipate paying cash dividends, and accordingly, stockholders must rely on stock appreciation for any return on their investment.

We have never paid cash dividends on our common stock and we do not expect to pay cash dividends on our common stock at any time in the foreseeable future. The future payment of dividends directly depends upon our future earnings, capital requirements, financial requirements and other factors that our board of directors will consider. As a result, only appreciation of the price of our common stock, which may never occur, will provide a return to stockholders. Investors seeking cash dividends should not invest in our common stock.

If securities or industry analysts do not publish research or reports about our business, or publish negative reports about our business, our stock price and trading volume could decline. The trading market for our common stock will be influenced by the research and reports that securities or industry analysts publish about us or our business.

We do not have any control over securities or industry analysts. If one or more of the analysts who cover us downgrade our common stock or change their opinion of our common stock, our common stock price would likely decline which in turn would likely cause a decline in the value of our warrants and 2020 Notes. If one or more of these analysts cease coverage of us or fail to regularly publish reports on us, we could lose visibility in the financial markets, which could cause our common stock price and the price of our warrants and 2020 Notes to decline or the trading volume of such securities to decline.

We are subject to anti-takeover provisions in our amended and restated certificate of incorporation, our amended and restated bylaws and under Delaware law that could delay or prevent an acquisition of the Company, even if the acquisition would be beneficial to our stockholders.

Provisions in our amended and restated certificate of incorporation and our amended and restated bylaws may delay or prevent an acquisition of the Company. Among other things, our amended and restated certificate of incorporation and amended and restated bylaws provide for a board of directors that is divided into three classes with staggered three-year terms, provide that all stockholder action must be effected at a duly called meeting of the stockholders and not by a consent in writing, and further provide that only our board of directors may call a special meeting of the stockholders. These provisions may also frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors, who are responsible for appointing the members of our management team. Furthermore, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, which prohibits, with some exceptions, stockholders owning in excess of 15% of our outstanding voting stock from merging or combining with us. Finally, our charter documents establish advance notice requirements for nominations for election to our board of directors and for proposing matters that can be acted upon at stockholder meetings. Although we believe these provisions together provide an opportunity to receive higher bids by requiring potential acquirers to negotiate with our board of directors, they would apply even if an offer to acquire the Company may be considered beneficial by some stockholders.

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Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

Our corporate headquarters and research and development laboratories, included in our Gevo, Inc, segment, are located in Englewood, Colorado. In January 2016, we amended our lease to extend the term until July 2021 and to reduce the amount of leased space from 29,865 square feet to approximately 19,241 square feet, effective July 2016. We believe that the facility with the reduced square footage will be adequate for our needs for the immediate future and that, should it be needed, additional space can be leased to accommodate any future growth.

We own and operate an ethanol and isobutanol production facility located in Luverne, Minnesota on approximately 55 acres of land and contains approximately 50,000 square feet of building space. The production facility was originally constructed in 1998. The land and buildings are subject to a mortgage lien and security interest to secure the obligations under our 2020 Notes.

Item 3. Legal Proceedings

From time to time, we have been and may again become involved in legal proceedings arising in the ordinary course of our business. We are not presently a party to any litigation that we believe to be material and we are not aware of any pending or threatened litigation against us that we believe could have a material adverse effect on our business, operating results, financial condition or cash flows.

Item 4. Mine Safety Disclosures

Not Applicable.

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PART II

Item 5. Market for Registrant’s Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities Market for Common Stock

The Company's common stock is listed and traded on the Nasdaq Capital Market under the symbol "GEVO".

Holders of Record

As of February 28, 2019, there were approximately 21 holders of record of our common stock. We believe that the number of beneficial owners is substantially greater than the number of record holders because a large portion of our common stock is held of record through brokerage firms in “street name.”

Dividends

No cash dividends have been paid on our common stock to date, nor do we anticipate paying dividends in the foreseeable future. Any future determination to declare cash dividends on our common stock will be made at the discretion of our Board of Directors, subject to compliance and limitations under our debt arrangements.

Performance Graph

Set forth below is a graph comparing the annual change in the cumulative total return of Gevo’s common stock with the cumulative total return of the Standard & Poor’s SmallCap 600 Value Index and with the Nasdaq Clean Edge Green Energy Index over the period December 31, 2013 through December 31, 2018.

It is assumed in the graph that $100 was invested (i) in our common stock; (ii) in the stocks of the companies in the Standard & Poor’s SmallCap 600 Value Index; and (iii) in the stocks of the Nasdaq Clean Edge Green Energy Index.

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The stock price performance shown on the following graph is not indicative of future price performance

Recent Sales of Unregistered Securities; Use of Proceeds from Registered Securities

None.

Purchases of Equity Securities by the Issuer

None.

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Item 6. Selected Financial Data

Not required.

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

Company Overview

We are a next generation "low-carbon" fuel company focused on the development and commercialization of renewable alternatives to petroleum-based products. Low-carbon fuels reduce the carbon intensity, or the level of greenhouse gas emissions, compared to standard fossil-based fuels across their lifecycle. The most common low-carbon fuels are renewable fuels. We are focused on the development and production of mainstream fuels like jet fuel and gasoline using renewable feedstocks that have the potential to lower greenhouse gas emissions at a meaningful scale and enhance agricultural production, including food and other related products. In addition to serving the low-carbon fuel markets, we can also serve markets for the production of chemical intermediate products for solvents, plastics, and building block chemicals using our technologies.

Our proven production technologies target what we believe to be large potential markets of renewable fuels and related chemicals that can compete directly against petrochemical products depending on the price of oil and the value of carbon intensity reductions. Renewable fuels are one of the few fuel products where the value for renewable carbon has already been established, particularly in the United States and the European Union. We believe that the demand for low-carbon fuels and renewable chemicals will continue to grow in the future.

Outlook for 2019

In 2019, we intend to continue to develop the markets for our renewable isooctane, jet fuel and isobutanol products made from isobutanol and ethanol, including the value-added animal feed and protein products. We plan to decarbonize the Luverne Facility which will lower the carbon footprint of the products we produce. The resulting low-carbon ethanol is expected to generate improved margins, the results of which we expect to be realized beginning in 2020, depending on project completion schedules. In addition to establishing the infrastructure to decarbonize the Luverne Facility and improve the profitability of the Luverne Facility, we intend to enter into binding, financeable supply contracts for jet fuel, on-road gasoline with isooctane, and isobutanol. We believe that the combination of these agreements, along with the expected financeable nature of these contracts, will help enable us to finance the build-out the Luverne Facility.

The focus for operational, sales and market development activities in 2019 is expected to be the following:

Enter into binding, financeable jet fuel off-take contracts for general business aviation and commercial aviation.

Enter into binding, financeable off-take contracts for isooctane for use in on-road gasoline.

Continue to develop the oxygenated ethanol free gasoline market using isobutanol, primarily in reformulated gasoline or RFG areas. We plan to increase its distribution network, and add additional regions, broadening our distribution footprint. We intend to use isobutanol in inventory to develop these sales.

Continue to produce jet fuel and isooctane at the production facility at South Hampton Resources, Inc. in Silsbee, Texas using previously inventoried renewable isobutanol as a feedstock.

Use the agreement with HCS to obtain financing for and begin construction of a 1 MGPY isooctane and jet plant to be located at the Luverne Facility. The 1 MGPY hydrocarbon plant would increase Gevo's hydrocarbon production capabilities by a factor of 10 and allow Gevo to better develop the markets for jet fuel and isooctane. As part of the 1 MGPY hydrocarbon plant project, Gevo expects to also improve the production assets for isobutanol with the goal of lowering the cost of isobutanol production.

Sell approximately 18 million gallons or more of ethanol.

Begin selling value-added animal feed, protein products, and corn oil which is expected to improve the profitability of the Luverne Facility. The total amount of animal feed product expected to be sold is greater than 50,000 metric tons.

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Luverne Facility Update

As previously announced, we are undertaking several initiatives to improve the profitability of the Luverne Facility. Specifically, we are adapting and optimizing the Luverne Facility's energy and equipment infrastructure to use lower amounts of lower fossil-based energy sources to lower the carbon intensity score of our products and decrease our production costs. We are also installing a process, the Shockwave Process, to fractionate corn to enable more feed and food products to be sold from the Luverne Facility that should increase revenues and profitability at the Luverne Facility. The Shockwave Process is expected to be operational during the first half of 2019. In addition, we are currently evaluating the implementation of one or more of the following systems or technologies to further lower our use of fossil-based energy sources at the Luverne Facility: combined heat and power systems; manure biogas, wind power and certain other expansion and energy reduction technologies. We expect that by approximately the end of 2020 we will have completed certain projects at our Luverne Facility to improve the carbon intensity score of our products that will increase the value of our ethanol and related products and that should translate into increased revenues for us as a result of the credits associated with our renewable fuels under LCFS and/or RFS. We expect this 'de-carbonization' process will benefit future production expansions at the Luverne Facility if implemented.

As previously disclosed, during 2017, we hired a third-party engineering firm to test the structural integrity of two of our three carbon steel production fermentation vessels. The results of the testing indicate that one of these fermentation vessels had at least one more year of life before needing repair, and the other one had approximately two months of life remaining. In the middle of 2018, we hired a third-party engineering firm to test the third carbon steel fermenter. The results indicated the vessel had approximately 1 year of useful life remaining. Besides these three carbon steel production fermenters, we have two stainless steel production fermenters.

Recently, we decided to repair two of the carbon steel fermentation vessels. Repairs are expected to be completed by the second quarter of 2019, at an estimated cost of approximately $0.6 million. After the repairs, the estimated useful life of the vessels is expected to be twenty-years.

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Financial Condition

For the year ended December 31, 2018, we incurred a consolidated net loss of $28.0 million and had an accumulated deficit of $429.3 million. Our cash and cash equivalents at December 31, 2018 totaled $33.7 million, which is primarily being used for the following: (i) operating activities of our Luverne Facility; (ii) operating activities at our corporate headquarters in Colorado, including research and development work; (iii) capital improvements primarily associated with the Luverne Facility; (iv) exploration of strategic alternatives and new financings; and (v) debt service obligations.

The continued operation of our business is dependent upon raising additional capital through future public and private equity offerings, debt financings or through other alternative financing arrangements. In addition, successful completion of our research and development programs and the attainment of profitable operations are dependent upon future events, including our ability to raise sufficient capital to expand our commercial production facility, completion of our development activities resulting in sales of isobutanol or isobutanol-derived products and/or technology, achieving market acceptance and demand for our products and services and attracting and retaining qualified personnel.

We expect to incur future net losses as we continue to fund the development and commercialization of our products and product candidates. We have primarily relied on raising capital to fund our operations and debt service obligations by issuing common stock and warrants in underwritten public offerings. Those issuances have caused significant dilution to our existing stockholders. While we have sought, and will continue to seek, other, less dilutive forms financing to fund our operations and debt service obligations, there is no assurance that we will be successful in doing so.

Our transition to profitability is dependent upon, among other things, the successful development and commercialization of our products and product candidates, the achievement of a level of revenues adequate to support our cost structure and securing sufficient financing for the expansion of the Luverne Facility or a facility at another suitable location. We may never achieve profitability or generate positive cash flows, and unless and until we do, we will continue to need to raise additional cash. We intend to fund future operations through additional private and/or public offerings of debt or equity securities. In addition, we may seek additional capital through arrangements with strategic partners or from other sources, may seek to restructure our debt and we will continue to address our cost structure. Notwithstanding, there can be no assurance that we will be able to raise additional funds, or achieve or sustain profitability or positive cash flows from operations.

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Results of Operations

Comparison of the years ended December 31, 2018 and 2017

(in thousands)	Years Ended December 31, 2018	2017	Change
Revenue and cost of goods sold			
Ethanol sales and related products, net	$31,641	$26,279	$5,362
Hydrocarbon revenue	1,197	1,029	168
Grant and other revenue	25	228	(203)
Total revenues	32,863	27,536	5,327
Cost of goods sold	41,568	38,165	3,403
Gross loss	(8,705)	(10,629)	1,924
Operating expenses			
Research and development expense	5,374	5,182	192
Selling, general and administrative expense	8,122	7,471	651
Total operating expenses	13,496	12,653	843
Loss from operations	(22,201)	(23,282)	1,081
Other (expense) income			
Interest expense	(3,237)	(2,951)	(286)
(Loss) on exchange or conversion of debt	(2,202)	(4,933)	2,731
(Loss)/Gain from change in fair value of derivative warrant liability	(2,976)	5,101	(8,077)
Gain from change in fair value of 2020 Notes embedded derivative	2,637	1,751	886
(Loss) from change in fair value of 2017 Notes	–	(339)	339
Other income	3	23	(20)
Total other (expense) income	(5,775)	(1,348)	(4,427)
Net loss	$(27,976)	$(24,630)	$(3,346)

Revenue. During the year ended December 31, 2018, we recognized revenue of $31.6 million associated with the sale of 19.4 million gallons of ethanol, as well as isobutanol and related products, an increase of $5.4 million from the year ended December 31, 2017, primarily related to increased production and sales of ethanol at the Luverne Facility. Hydrocarbon revenue increased $0.2 million during the year ended December 31, 2018 primarily as a result of greater shipments of finished products from our demonstration plant located at the South Hampton Facility. Hydrocarbon revenues are comprised of ATJ, isooctane and isooctene sales. Grant and other revenue was $25,000 during the year ended December 31, 2018, down $0.2 million compared to the same period in 2017, primarily as a result of the Company's contract with the NARA ending in 2017.

Cost of goods sold. Our cost of goods sold during the year ended December 31, 2018 included $35.3 million associated with the production of ethanol, isobutanol and related products and $6.3 million in depreciation expense. Cost of goods sold increased $3.4 million during the year ended December 31, 2018, primarily due to increased production and sales of ethanol as compared to the prior year.

Research and development expense. Research and development expenses increased $0.2 million during the year ended December 31, 2018 compared to the prior year, primarily due to an increase in facility expansion fees related to the South Hampton Facility.

Selling, general and administrative expense. Selling, general and administrative expenses increased $0.7 million during the year ended December 31, 2018 compared to the prior year primarily from increases of $0.3 million in accounting and professional fees, $0.1 million in legal expenses, $0.4 million in consulting expenses, and $0.2 million increase in property and franchise tax expense, partially offset by a $0.2 million decrease in employee related expenses.

Loss on exchange or conversion of debt. During the year ended December 31, 2018, we incurred a loss of $2.2 million resulting from the exchange of approximately $3.2 million of our 2020 Notes for our common stock.

Loss from change in fair value of derivative warrant liability. During the year ended December 31, 2018, we recognized a loss of $3.0 million primarily as a result of the increase in the fair value of the derivative warrant liability at the time certain of our outstanding warrants were exercised in 2018 due to the increase in the price of our common stock at the time of exercise.

Gain from change in fair value of 2020 Notes embedded derivative. During the year ended December 31, 2018, the estimated fair value of the 2020 Notes embedded derivative liability decreased, resulting in a non-cash gain of $2.6 million primarily due to the decrease in the price of our common stock since June 20, 2017 issuance date.

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Comparison of the years ended December 31, 2017 and 2016

(in thousands)	Years Ended December 31, 2017	2016	Change
Revenue and cost of goods sold			
Ethanol sales and related products, net	$26,279	$24,613	$1,666
Hydrocarbon revenue	1,029	1,929	(900)
Grant and other revenue	228	671	(443)
Total revenues	27,536	27,213	323
Cost of goods sold	38,165	37,017	1,148
Gross loss	(10,629)	(9,804)	(825)
Operating expenses			
Research and development expense	5,182	5,216	(34)
Selling, general and administrative expense	7,471	8,965	(1,494)
Total operating expenses	12,653	14,181	(1,528)
Loss from operations	(23,282)	(23,985)	703
Other (expense) income			
Interest expense	(2,951)	(7,837)	4,886
(Loss) on exchange or conversion of debt	(4,933)	(763)	(4,170)
(Loss) on extinguishment of warrant liability	-	(918)	918
Gain from change in fair value of derivative warrant liability	5,101	1,783	3,318
Gain from change in fair value of 2020 Notes embedded derivative	1,751	-	1,751
(Loss) from change in fair value of 2017 Notes	(339)	(4,204)	3,865
(Loss) on issuance of equity	-	(1,519)	1,519
Other income	23	215	(192)
Total other (expense) income	(1,348)	(13,243)	11,895
Net loss	$(24,630)	$(37,228)	$12,598

Revenue. During the year ended December 31, 2017, we recognized revenue of $26.3 million associated with the sale of 15.6 million gallons of ethanol, as well as isobutanol and related products, an increase of $1.7 million from the year ended December 31, 2016 primarily related to increased production and sales at the Luverne Facility. Hydrocarbon revenue decreased during the year ended December 31, 2017 primarily as a result of lower shipments of finished products from our demonstration plant located at the South Hampton Facility. Grant and other revenue was $0.2 million during the year ended December 31, 2017, down $0.4 million on as compared to the same period in 2016, primarily as a result of the Company's contract with the NARA ending in 2017.

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Cost of goods sold. Our cost of goods sold during the year ended December 31, 2017 compared to the prior year included $32.0 million associated with the production of ethanol, isobutanol and related products and $6.2 million in depreciation expense. Cost of goods sold increased $1.1 million during the year ended December 31, 2017 compared to the prior year, primarily due to increased production and sales of ethanol as compared to the prior year.

Research and development expense. Research and development expenses decreased during the year ended December 31, 2017, primarily due to a $0.3 million decrease in depreciation expenses.

Selling, general and administrative expense. The decrease of $1.5 million in selling, general and administrative expenses during the year ended December 31, 2017 compared to the prior year primarily resulted from decreases of $0.6 million in salary related expenses, $0.2 million in legal expenses, and $0.5 million in consulting expenses.

Loss on exchange or conversion of debt. During the year ended December 31, 2017, we incurred a loss of $0.9 million due to the exchange of a portion of our 2022 Notes for our common stock and a $3.9 million loss on the exchange of our 2017 Notes for our 2020 Notes.

Gain from change in fair value of derivative warrant liability. In December 2013, August 2014, February 2015, May 2015, December 2015, April 2016, September 2016 and February 2017, we issued warrants to purchase our common stock which are recorded at fair value each reporting period. During the year ended December 31, 2017, the estimated fair value of the derivative warrant liability decreased primarily due to a decline in the price of our common stock, and as a result, we reported a $5.1 million gain for the year ended December 31, 2017.

Gain from change in fair value of 2020 Notes embedded derivative. During the year ended December 31, 2017, the estimated fair value of the 2020 Notes embedded derivative liability decreased, resulting in a non-cash gain of $1.8 million primarily due to the decrease in the price of our common stock from the June 20, 2017 issuance date.

Loss from change in fair value of the 2017 Notes. During the year ended December 31, 2017, we reported a $0.3 million loss associated with the increase in fair value of the 2017 Notes, primarily as a result of the decrease in the time to maturity during the period of time the 2017 Notes were still outstanding in 2017.

Revenues, Cost of Goods Sold and Operating Expenses

Revenues

During 2018, 2017 and 2016, we generated revenue primarily from: (i) the sale of ethanol, isobutanol and related products; (ii) hydrocarbon sales consisting primarily of the sale of biojet fuel, and isooctane derived from our isobutanol for purposes of certification and testing; and (iii) government grants and research and development programs.

Cost of Goods Sold and Gross Loss

Our cost of goods sold during the years ended December 31, 2018, 2017 and 2016 primarily includes costs directly associated with ethanol production and initial operations for the production of isobutanol at the Luverne Facility such as costs for direct materials, direct labor, depreciation, other operating costs and certain plant overhead costs. Direct materials include corn feedstock, denaturant and process chemicals. Direct labor includes compensation of personnel directly involved in production operations at the Luverne Facility. Other operating costs include utilities and natural gas usage.

Our gross loss is defined as our total revenues less our cost of goods sold.

Research and Development

Our research and development costs consist of expenses incurred to identify, develop and test our technologies for the production of isobutanol and the development of downstream applications thereof. Research and development expenses include personnel costs (including stock-based compensation), consultants and related contract research, facility costs, supplies, depreciation and amortization expense on property, plant and equipment used in product development, license fees paid to third parties for use of their intellectual property and patent rights and other overhead expenses incurred to support our research and development programs. Research and development expenses also include upfront fees and milestone payments made under licensing agreements and payments for sponsored research and university research gifts to support research at academic institutions.

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Selling, General and Administrative

Selling, general and administrative expenses consist of personnel costs (including stock-based compensation), consulting and service provider expenses (including patent counsel-related costs), legal fees, marketing costs, corporate insurance costs, occupancy-related costs, depreciation and amortization expenses on property, plant and equipment not used in our product development programs or recorded in cost of goods sold, travel and relocation expenses and hiring expenses.

We also record selling, general and administrative expenses for the operations of the Luverne Facility that include administrative and oversight expenses, certain personnel-related expenses, insurance and other operating expenses.

Liquidity and Capital Resources

Since our inception in 2005, we have devoted most of our cash resources to manufacturing ethanol, isobutanol and related products, research and development and selling, general and administrative activities related to the commercialization of isobutanol, as well as related products from renewable feedstocks. We have incurred losses since inception and expect to incur losses through at least 2020. We have financed our operations primarily with proceeds from multiple sales of equity and debt securities, borrowings under debt facilities and product sales.

The continued operation of our business is dependent upon raising additional capital through future public and private equity offerings, debt financings or through other alternative financing arrangements. In addition, successful completion of our research and development programs and the attainment of profitable operations are dependent upon future events, including our ability to raise sufficient capital to expand our commercial production facility, completion of our development activities resulting in sales of isobutanol or isobutanol-derived products and/or technology, achieving market acceptance and demand for our products and services and attracting and retaining qualified personnel.

We expect to incur future net losses as we continue to fund the development and commercialization of our products and product candidates. We have primarily relied on raising capital to fund our operations and debt service obligations by issuing common stock and warrants in underwritten public offerings. Those issuances have caused significant dilution to our existing stockholders. While we have sought, and will continue to seek, other, less dilutive forms financing to fund our operations and debt service obligations, there is no assurance that we will be successful in doing so.

Our transition to profitability is dependent upon, among other things, the successful development and commercialization of our products and product candidates, the achievement of a level of revenues adequate to support our cost structure and securing sufficient financing for the build-out and Retrofit of the Luverne Facility or a facility at another suitable location. We may never achieve profitability or generate positive cash flows, and unless and until we do, we will continue to need to raise additional cash. We intend to fund future operations through additional private and/or public offerings of debt or equity securities. In addition, we may seek additional capital through arrangements with strategic partners or from other sources, may seek to restructure our debt and we will continue to address our cost structure. Notwithstanding, there can be no assurance that we will be able to raise additional funds, or achieve or sustain profitability or positive cash flows from operations.

The following table sets forth the major sources and uses of cash for each of the periods set forth below (in thousands):

	Year Ended December 31,	
	2018	**2017**
Net cash used in operating activities	$(15,851)	$(20,627)
Net cash used in investing activities	(2,233)	(1,906)
Net cash provided by financing activities	40,265	6,198

Operating Activities

Our primary uses of cash from operating activities are personnel-related expenses and research and development-related expenses including costs incurred under development agreements, costs for licensing of technology, legal-related costs and expenses for the production of isobutanol, ethanol and related products, logistics and further processing of ethanol and isobutanol at the Luverne Facility and for the operation of our hydrocarbon demonstration production facility.

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During the year ended December 31, 2018, we used $15.9 million in cash for operating activities due to a net loss of $28.0 million, excluding the impact of $11.3 million in non-cash expenses, and $0.8 million net cash increase associated with an decrease in working capital primarily a result of a decreases in both receivables and inventories.

During the year ended December 31, 2017, we used $20.6 million in cash for operating activities due to a net loss of $24.6 million, offset by the impact of $6.4 million in non-cash expenses, and $2.4 million net cash used due to an increase in working capital primarily as a result of a paydown of accounts payable coupled with an increase in accounts receivable .

Investing Activities

During the year ended December 31, 2018, we used $2.2 million in cash for investing activities related to capital expenditures at our Luverne Facility.

During the year ended December 31, 2017, we used $1.9 million in cash for investing activities, all of which was related to capital expenditures at our Luverne Facility.

Financing Activities

During the year ended December 31, 2018, we generated $40.3 million in cash from financing activities primarily related to $39.4 million in proceeds from issuance of common stock, and $1.3 million in proceeds from the exercise of warrants.

During the year ended December 31, 2017, we generated $6.2 million in cash from financing activities primarily related to $11.0 million in proceeds from issuance of common stock, $2.6 million release of restricted cash, and $3.4 million in proceeds from the exercise of warrants. These gains in cash were offset by $9.8 million in principal payments to Whitebox, and $1.1 million in equity and debt offering costs.

2020 Notes

On April 19, 2017, we entered into the an Exchange and Purchase Agreement (the "Purchase Agreement") with the WB Gevo, LTD (the "Holder"), the holder of the 2017 Notes, and Whitebox Advisors LLC, in its capacity as representative of the Holder. Pursuant to the terms of the Purchase Agreement, the Holder, subject to certain conditions, including approval of the transaction by our stockholders (which was received on June 15, 2017), agreed to exchange all of the outstanding principal amount of the 2017 Notes for an equal principal amount of our newly created 2020 Notes, plus an amount in cash equal to the accrued and unpaid interest (other than interest paid in kind) on the 2017 Notes (the “Exchange”). As noted above, on June 20, 2017, we completed the Exchange, terminated the indenture by and among the Company, its subsidiaries in their capacity as guarantors, and Wilmington Savings Fund Society, FSB, as trustee (the "2017 Notes Indenture") and cancelled the 2017 Notes. As of December 31, 2017, the outstanding principal on the 2020 Notes was $16.7 million, including paid-in-kind interest.

The 2020 Notes mature on March 15, 2020. The 2020 Notes bear interest at a rate equal to 12% per annum (with 2% potentially payable as PIK Interest (as defined and described below) at our option), payable on March 31, June 30, September 30, and December 31 of each year. Under certain circumstances, we have the option to pay a portion of the interest due on the 2020 Notes by either (a) increasing the principal amount of the 2020 Notes by the amount of interest then due or (b) issuing additional 2020 Notes with a principal amount equal to the amount of interest then due (interest paid in the manner set forth in (a) or (b) being referred to as “PIK Interest”).

The 2020 Notes are convertible into shares of our common stock, subject to certain terms and conditions. The initial conversion price of the 2020 Notes is equal to $14.72 per share of common stock, or 0.0679 shares of common stock per $1 principal amount of 2020 Notes (the “Conversion Price”).

See Note 9, *Debt*, to our consolidated financial statements included herein for further discussion of the 2020 Notes.

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2022 Notes

In July 2012, we issued and sold $45.0 million in aggregate principal amount of 2022 Notes, for net proceeds of $40.9 million, after accounting for $2.7 million and $1.4 million of cash discounts and issue costs, respectively. The 2022 Notes bore interest at 7.5% which was to be paid semi-annually in arrears on January 1 and July 1 of each year commencing on January 1, 2013.

In the first quarter of 2018, we issued an aggregate of 780,303 shares of our common stock in exchange for the redemption of the then remaining $515,000 in outstanding 2022 Notes. As a result of this exchange, all obligations under the 2022 Notes have been fully satisfied.

At-the-Market Offering Program.

In February 2018, we commenced an at-the-market offering program, which initially allowed us to sell and issue up to $5.0 million of shares of our common stock. The at-the-market offering program was amended multiple times in June 2018 to increase the available capacity under the at-the-market offering program by an aggregate of approximately $84.9 million. As of December 31, 2018, we have remaining capacity to issue and sell up to approximately $44.6 million of additional shares of common stock under the at-the-market offering program.

During the year ended December 31, 2018, we issued 6,936,930 shares of common stock (after giving effect to the Reverse Stock Split under the at-the-market offering program for gross proceeds of $40.3 million. We paid commissions to our sales agent of approximately $0.9 million and incurred other offering related expenses of $0.4 million during the year ended December 31, 2018. During the three months ended December 31, 2018, we issued 545,313 shares of common stock under the at-the-market offering program for gross proceeds of $2.5 million. We paid commissions to our sales agent of approximately $0.1 million and incurred other offering related expenses of less than $0.1 million.

We issued 3,244,941 shares of common stock, for gross proceeds of $9.9 million after December 31, 2018.

Contractual Obligations and Commitments

The following summarizes the future commitments arising from our contractual obligations at December 31, 2018 (in thousands).

	Less than 1 year	1-3 years	4 - 5 years	Thereafter	Total
Principal debt payments (1)	$-	$14,112	$-	$ -	$14,112
Interest payments on debt (2)	1,388	297	-	-	1,685
Other contractual commitments (3)	291	261	56	-	608
Operating leases (4)	1,414	873	-	-	2,287
Insurance and Maintenance	94	196	208	-	498
Total	$3,187	$15,738	$264	$ -	$19,189

(1) Principal debt payments include the principal amounts of the outstanding 2020 Notes.

(2) Interest payments due to holders of the 2020 Notes.

(3) Contracts securing minimum guaranteed capacity on third party pipeline infrastructure providing natural gas to our Luverne Facility.

(4) Commitments for operating leases primarily relate to our leased facility in Englewood, Colorado and our lease for rail cars for ethanol and isobutanol shipments.

The table above reflects only payment obligations that are fixed and determinable. The above amounts exclude potential payments to be made under our license and other agreements that are based on the achievement of future milestones or royalties on product sales.

Off-Balance Sheet Arrangements

As of December 31, 2018, we did not have any off-balance sheet arrangements, or relationships with unconsolidated entities, such as entities often referred to as structured finance or special purpose entities, established for the purpose of facilitating off-balance sheet arrangements or other contractually narrow or limited purposes.

Critical Accounting Policies and Estimates

The preparation of financial statements in conformity with GAAP, in the U.S. requires management to make estimates, assumptions and judgments that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the consolidated financial statements and the reported amounts of revenue and expenses during the reporting period. Management bases its estimates, assumptions and judgments on historical experience and on various other factors that are believed to be reasonable under the circumstances. Different assumptions and judgments would change the estimates used in the preparation of our consolidated financial statements, which in turn, could change the results from those reported. Our management evaluates its estimates, assumptions and judgments on an ongoing basis.

While our significant accounting policies are more fully described in Note 2 to our consolidated financial statements included in this Report, we believe that the following accounting policies are the most critical to aid you in fully understanding and evaluating our reported financial results and reflect the more significant judgments and estimates that we use in the preparation of our consolidated financial statements.

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Accounting for Senior Secured Debt, Convertible Notes and Embedded Derivative

2020 Notes

See "Liquidity and Financial Resources—2020 Notes" above and Note 9, Debt, to our consolidated financial statements included herein for further discussion of the 2020 Notes.

2022 Notes and Embedded Derivative

See “—Liquidity and Financial Resources—2022 Notes.”

The Company had concluded that the embedded derivatives within the 2020 Notes required separation from the host instrument and was re-valued each reporting period, with changes in the fair value of the embedded derivative recognized as a component of the Company’s consolidated Statements of Operations. In January 2018, the Company entered into a private exchange agreement with a holder of the 2022 Notes to exchange the remaining $0.5 million of outstanding principal amount of the 2022 Notes for an aggregate of 780,303 shares of common stock. Upon completion of this exchange, the 2022 Notes were satisfied in their entirety and there are no remaining obligations under the 2022 Notes, including any remaining obligations under the 2022 Notes embedded derivative. Accordingly, the fair value of the 2022 Notes embedded derivative was zero as of December 31, 2018.

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Derivative Warrant Liability

The following sets forth information pertaining to shares underlying warrants outstanding as of December 31, 2018:

	Issuance Date	Expiration Date	Exercise Price as of December 31, 2018	Shares Underlying Warrants on Issuance Date	Shares Issued upon Warrant Exercises as of December 31, 2018	Shares Underlying Warrants Outstanding as of December 31, 2018 (1)
2014 Warrants	08/05/2014	08/05/2019	$ 65.50	2,500	1,526	974
Series A Warrants	02/03/2015	02/03/2020	$ 3.80	5,542	5,222	320
Series C Warrants	05/19/2015	05/19/2020	$ 53.43	1,075	–	1,075
Series D Warrants	12/11/2015	12/11/2020	$ 40.00	25,125	25,078	47
Series F Warrants	04/01/2016	04/01/2021	$ 40.00	25,733	11,692	14,041
Series I Warrants	09/13/2016	09/13/2021	$ 220.00	35,650	–	35,650
Series K Warrants	02/17/2017	2/17/2022	$ 3.80	312,516	308,660	3,856
				408,141	352,178	55,963

(1) This table does not include equity-classified warrants issued in 2011, to purchase 6 shares of common stock with a strike price of $345 per share.

The agreements governing the above warrants include the following terms:

- certain warrants have exercise prices which are subject to adjustment for certain events, including the issuance of stock dividends on our common stock and, in certain instances, the issuance of our common stock or instruments convertible into our common stock at a price per share less than the exercise price of the respective warrants;

- warrant holders may exercise the warrants through a cashless exercise if, and only if, we do not have an effective registration statement then available for the issuance of the shares of our common stock. If an effective registration statement is available for the issuance of our common stock, a holder may only exercise the warrants through a cash exercise;

- the exercise price and the number and type of securities purchasable upon exercise of the warrants are subject to adjustment upon certain corporate events, including certain combinations, consolidations, liquidations, mergers, recapitalizations, reclassifications, reorganizations, stock dividends and stock splits, a sale of all or substantially all of our assets and certain other events; and

- in the event of an extraordinary transaction (as defined in the respective warrant agreements), generally including any merger with or into another entity, sale of all or substantially all of our assets, tender offer or exchange offer, or reclassification of its common stock, in which the successor entity (as defined in the respective warrant agreements) that assumes the warrant is not a publicly traded company, we or any successor entity will pay the warrant holder, at such holder's option, exercisable at any time concurrently with or within 30 days after the consummation of the extraordinary transaction, an amount of cash equal to the value of such holder's warrants as determined in accordance with an appropriate valuation model and the terms of the respective warrant agreement.

Based on these terms, we determined that all warrants issued since 2013 (the "Warrants") qualify as derivatives and, as such, are presented as a derivative warrant liability on the consolidated balance sheets and recorded at fair value each reporting period. The fair value of the Warrants was estimated to be $22,000 and $2.0 million as of December 31, 2018 and December 31, 2017, respectively. The decrease in the estimated fair value of the Warrants outstanding as of December 31, 2018 represents an unrealized gain which has been recorded as a gain from the change in fair value of derivative warrant liability in the consolidated statements of operations.

During the year ended December 31, 2018, common stock was issued as a result of exercise of Warrants as described below:

	Twelve Months Ended December 31, 2018	
	Common Stock Issued	**Proceeds**
Series A Warrants	251	$1,054
Series K Warrants	300,660	1,262,712
	300,911	$1,263,766

Impairment of Property, Plant and Equipment

Our property, plant and equipment consist primarily of assets associated with the acquisition and Retrofit of the Luverne Facility. We assess impairment of property, plant and equipment for recoverability when events or changes in circumstances indicate that their carrying amount may not be recoverable. Circumstances applicable to our current stage of operations which could trigger a review include, but are not limited to: (i) significant decreases in the market price of the asset; (ii) significant adverse changes in the business climate or legal or regulatory factors; (iii) accumulation of costs significantly in excess of the amount originally expected for the acquisition or construction of the asset; and (iv) expectations that the asset will more likely than not be sold or disposed of significantly before the end of its estimated useful life. The carrying amount of a long-lived asset is considered to be impaired if it exceeds the sum of the undiscounted cash flows expected to result from the use and eventual disposition of the asset.

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We evaluated our long-lived assets for impairment as of December 31, 2018. This evaluation included comparing the carrying amount our long-lived assets to the undiscounted future cash flows of our consolidated net assets as this represents the lowest level of identifiable cash flows. Significant assumptions included in the estimated undiscounted future cash flows include, among others, estimates of the:

- sales price of isobutanol, hydrocarbons, ethanol and by-products such as dried distiller's grains;
- purchase price of corn;
- production levels of isobutanol;
- capital and operating costs to produce isobutanol; and
- estimated useful life of the primary asset.

Factors which can impact these assumptions include, but are not limited to;

- effectiveness of our technology to produce isobutanol at targeted margins;
- demand for isobutanol, hydrocarbon and oil prices; and
- harvest levels of corn.

Based upon our evaluation at December 31, 2018, we concluded that the estimated undiscounted future cash flows from Luverne exceeded the carrying value of the Luverne Facility and, as such, these assets were not impaired. Although our cash flow forecasts are based on assumptions that are consistent with our planned use of the assets, these estimates required significant exercise of judgment and are subject to change in future reporting periods as facts and circumstances change. Additionally, we may make changes to our business plan that could result in changes to the expected cash flows. As a result, it is possible that a long- lived asset may be impaired in future reporting periods.

Stock-Based Compensation

Our stock-based compensation expense includes expenses associated with share-based awards granted to employees and board members and expenses associated with our employee stock purchase plan ("ESPP"). The estimated fair value of stock options and ESPP awards is determined on the date of grant and recorded to expense over the requisite service period, generally the vesting period. We estimate the fair value of stock option awards using the Black-Scholes option-pricing model which requires judgments to be made, including estimating: (i) the expected life of an award; (ii) stock price volatility; and (iii) prior to our initial public offering in February 2011, the fair value of our common stock.

The Black-Scholes option-pricing model calculates the estimated fair value of stock options using the following inputs: (i) expected stock option life; (ii) expected volatility; (iii) risk-free interest rate; (iv) expected dividend yield rate; (v) exercise price; and (vi) closing price of our common stock on the date of grant.

Due to our limited history of grant activity, we use the "simplified method" permitted by the SEC to estimate the expected stock option life as the arithmetic average of the total contractual term of the option and its vesting period. We calculate the estimated volatility rate based on selected comparable public companies, due to a lack of historical information regarding the volatility of our stock price. We will continue to analyze the historical stock price volatility assumption as more historical data for our common stock becomes available. The risk-free interest rate assumption is based on the U.S. Treasury yield curve in effect on the date of grant for instruments with a term similar to the expected life of the related option. No dividends are expected to be paid.

The estimated fair value of a stock option using the Black-Scholes option-pricing model is impacted significantly by changes in a company's stock price. For example, all other assumptions being equal, the estimated fair value of a stock option will increase as the closing price of a company's stock increases, and decrease as the closing price of a company's stock decreases. Prior to the closing of our initial public offering, we were a private company and, as such, we were required to estimate the fair value of our common stock. In the absence of a public trading market, we determined a reasonable estimate of the then-current fair value of our common stock for purposes of granting stock-based compensation based on multiple criteria. We determined the fair value of our common stock utilizing methodologies, approaches and assumptions consistent with the American Institute of Certified Public Accountants Practice Aid, "Valuation of Privately-Held-Company Equity Securities Issued as Compensation." After the closing of our initial public offering in February 2011, the fair value of our common stock is no longer an estimate as it is based upon the closing price of our stock on the date of grant.

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Revenue Recognition

Revenue Recognition. We record revenue from the sale of hydrocarbon products, ethanol and related products, including the sale of corn inventory. We recognize revenue when all of the following criteria are satisfied: (i) it has identified a contract with a customer; (ii) it has identified the performance obligations of the customer; (iii) it has determined the transaction price; (iv) it has allocated the transaction price to the identified performance obligations in the contract with the customer; (v) satisfied each individual performance obligation with the contract with a customer.

Ethanol and related products as well as hydrocarbon products are generally shipped free on board shipping point. Collectability of revenue is reasonably assured based on historical evidence of collectability with our customers. In accordance with our agreements for the marketing and sale of ethanol and related products, commissions due to marketers were deducted from the gross sales price at the time payment was remitted. Ethanol and related products sales were recorded net of commissions and shipping and handling costs.

Revenue related to government research grants and cooperative agreements is recognized in the period during which the related costs are incurred, provided that the conditions under the awards have been met and only perfunctory obligations are outstanding. Revenues related to the lease agreements are recognized on a straight-line basis over the term of the contract.

For the year ended December 31, 2018, Eco-Energy, accounted for approximately 72% of our consolidated revenue. For the years ended December 31, 2017 and 2016, C&N Ethanol Marketing, LLC accounted for approximately 76% and 71% of our consolidated revenue, respectively. In the same years, Purina accounted for approximately 21%, 17% and 17% of our consolidated revenue, respectively. All are customers of our Gevo Development/Agri-Energy segment. Given the production capacity compared to the overall size of the North American market and the fungible demand for our products, we do not believe that a decline in a specific customer's purchases would have a material adverse long-term effect upon our financial results.

Recent Accounting Pronouncements

See Note 2 in Item 8. “Financial Statements and Supplemental Data,” of this Report, for a discussion of recent accounting pronouncements.

Item 7A. Quantitative and Qualitative Disclosures about Market Risk

Not Required

Item 8. Financial Statements and Supplementary Data

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REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Board of Directors and Stockholders

Gevo, Inc.

Opinion on the financial statements

We have audited the accompanying consolidated balance sheets of Gevo, Inc.(a Delaware corporation) and subsidiaries (the "Company") as of December 31, 2018 and 2017, the related consolidated statements of operations, stockholders' equity, and cash flows for each of the three years in the period ended December 31, 2018, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2018 and 2017, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2018, in conformity with accounting principles generally accepted in the United States of America.

Changes in accounting principles

As discussed in Note 2 to the consolidated financial statements, in the first quarter of 2018, the Company changed its method of accounting for revenue due to the adoption of Accounting Standards Codification Topic 606, Revenue from Contracts with Customers.

Basis for opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) ("PCAOB") and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audits we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audits included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements. Our audits also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audits provide a reasonable basis for our opinion.

/s/ GRANT THORNTON LLP

We have served as the Company's auditor since 2015.

Denver, Colorado

March 28, 2019

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GEVO, INC.

CONSOLIDATED BALANCE SHEETS

(In thousands, except share and per share amounts)

	December 31,	
	2018	**2017**
Assets		
Current assets:		
Cash and cash equivalents	$33,734	$11,553
Accounts receivable	526	1,054
Inventories	3,166	4,362
Prepaid expenses and other current assets	1,284	712
Total current assets	38,710	17,681
Property, plant and equipment, net	67,036	70,369
Deposits and other assets	1,289	803
Total assets	$107,035	$88,853
Liabilities		
Current liabilities:		
Accounts payable and accrued liabilities	$4,874	$4,011
2020 Notes embedded derivative liability	394	5,224
Derivative warrant liability	22	1,951
Total current liabilities	5,290	11,186
2020 Notes, net	12,554	13,491
2022 Notes	-	515
Other long-term liabilities	404	130
Total liabilities	18,248	25,322
Commitments and Contingencies (see Note 18)	–	–
Stockholders' Equity		
Common stock, $0.01 par value per share; 250,000,000 authorized; 8,640,583 and 1,090,553 shares issued and outstanding at December 31, 2018 and 2017, respectively. (See Note 2)	86	11
Additional paid-in capital	518,027	464,870
Accumulated deficit	(429,326)	(401,350)
Total stockholders' equity	88,787	63,531
Total liabilities and stockholders' equity	$107,035	$88,853

See the accompanying Notes to the Consolidated Financial Statements.

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GEVO, INC.

CONSOLIDATED STATEMENTS OF OPERATIONS

(In thousands, except share and per share amounts)

	Year Ended December 31,		
	2018	**2017**	**2016**
Revenue and cost of goods sold			
Ethanol sales and related products, net	$31,641	$26,279	$24,613
Hydrocarbon revenue	1,197	1,029	1,929
Grant and other revenue	25	228	671
Total revenues	32,863	27,536	27,213
Cost of goods sold	41,568	38,165	37,017
Gross loss	(8,705)	(10,629)	(9,804)
Operating expenses			
Research and development expense	5,374	5,182	5,216
Selling, general and administrative expense	8,122	7,471	8,965
Total operating expenses	13,496	12,653	14,181
Loss from operations	(22,201)	(23,282)	(23,985)
Other (expense) income			
Interest expense	(3,237)	(2,951)	(7,837)
(Loss) on exchange or conversion of debt	(2,202)	(4,933)	(763)
(Loss)/Gain on extinguishment of warrant liability	-	-	(918)
Gain from change in fair value of 2020 Notes embedded derivative	2,637	1,751	-
(Loss)/Gain from change in fair value of derivative warrant liability	(2,976)	5,101	1,783
(Loss) from change in fair value of 2017 Notes	-	(339)	(4,204)
Loss on issuance of equity	-	-	(1,519)
Other income	3	23	215
Total other (expense) income	(5,775)	(1,348)	(13,243)
Net loss	$(27,976)	$(24,630)	$(37,228)
Net loss per share - basic and diluted	$(5.74)	$(30.23)	$(193.52)
Weighted-average number of common shares outstanding - basic and diluted	4,876,897	814,797	192,372

See the accompanying Notes to the Consolidated Financial Statements.

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GEVO, INC.

CONSOLIDATED STATEMENTS OF STOCKHOLDERS' EQUITY

(In thousands, except share amounts)

	Common Stock		Paid-In	Accumulated	Stockholders'
	Shares	Amount	Capital	Deficit	Equity
BALANCE—December 31, 2015	54,018	$ 1	$387,817	$ (339,492)	$ 48,326
Issuance of common stock under stock plans, net	139	–	–	–	–
Issuance of common stock, net of issue costs & warrants	124,005	1	34,223	–	34,224
Non-cash stock-based compensation	–	–	886	–	886
Issuance of common stock upon exercise of warrants	127,961	1	12,297	–	12,298
Issuance of common stock upon exchange or conversion of debt	47,589	–	10,758	–	10,758
Net loss	–	–	–	(37,228)	(37,228)
BALANCE—December 31, 2016	353,712	$ 4	$445,980	$ (376,720)	$ 69,264
Issuance of common stock under stock plans, net	150	–	–	–	–
Issuance of common stock, net of issue costs & warrants	284,000	3	6,392	–	6,395
Non-cash stock-based compensation	–	–	421	–	421
Issuance of common stock upon exercise of warrants	308,000	3	3,426	–	3,429
Issuance of common stock upon exchange of debt	144,691	1	8,651	–	8,652
Net loss	–	–	–	(24,630)	(24,630)
BALANCE—December 31, 2017	1,090,553	$ 11	$464,870	$ (401,350)	$ 63,531
Shares issued upon reverse stock split	12,261	–	–	–	–
Issuance of common stock under stock plans, net	119	–	–	–	–
Issuance of common stock, net of issue costs & warrants	6,936,930	69	38,877	–	38,946
Non-cash stock-based compensation	–	–	571	–	571
Issuance of common stock upon exercise of warrants	300,911	3	6,165	–	6,168
Issuance of common stock upon exchange of debt	299,809	3	7,544	–	7,547
Net loss	–	–	–	(27,976)	(27,976)
BALANCE—December 31, 2018	8,640,583	$ 86	$518,027	$ (429,326)	$ 88,787

See the accompanying Notes to the Consolidated Financial Statements.

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GEVO, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS

(In thousands)

	Year Ended December 31,		
	2018	**2017**	**2016**
Operating Activities			
Net loss	$(27,976)	$(24,630)	$(37,228)
Adjustments to reconcile net loss to net cash used in operating activities:			
Loss/(Gain) from the change in fair value of derivative warrant liability	2,976	(5,101)	(1,783)
(Gain) from the change in fair value of the embedded derivative to the 2020 Notes	(2,637)	(1,751)	-
Loss from the change in fair value of 2017 Notes	-	339	4,204
Loss on exchange or conversion of debt	2,202	4,933	763
Loss on extinguishment of warrant liability	-	-	918
Loss on issuance of equity	-	-	1,519
Stock-based compensation	571	421	886
Depreciation and amortization	6,520	6,641	6,747
Non-cash interest expense	1,706	962	3,977
Other non-cash expenses	6	-	(1)
Changes in operating assets and liabilities:			
Accounts receivable	528	68	269
Inventories	1,196	(904)	29
Prepaid expenses and other current assets	(630)	137	(119)
Accounts payable, accrued expenses, and long-term liabilities	(313)	(1,742)	(697)
Net cash used in operating activities	(15,851)	(20,627)	(20,516)
Investing Activities			
Acquisitions of property, plant and equipment	(2,233)	(1,906)	(5,938)
Proceeds from sales tax refund for property, plant and equipment	-	-	-
Net cash used in investing activities	$(2,233)	$(1,906)	$(5,938)

See the accompanying Notes to the Consolidated Financial Statements.

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GEVO, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS—(Continued)

(In thousands)

	Year Ended December 31,		
	2018	**2017**	**2016**
Financing Activities			
Payments on secured debt	$-	$(9,791)	$(504)
Debt and equity offering costs	(392)	(1,095)	(3,144)
Proceeds from issuance of common stock and common stock warrants	39,394	11,044	28,661
Proceeds from the exercise of warrants	1,263	3,429	12,298
Net cash provided by financing activities	40,265	3,587	37,311
Net increase (decrease) in cash and cash equivalents	22,181	(18,946)	10,857
Cash, cash equivalents, and restricted cash			
Beginning of year	11,553	30,499	19,642
Ending of year	$33,734	$11,553	$30,499

See the accompanying Notes to the Consolidated Financial Statements.

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GEVO, INC.

CONSOLIDATED STATEMENTS OF CASH FLOWS—(Continued)

(In thousands)

Supplemental disclosures of cash and non-cash investing and financing transactions	**Year Ended December 31, 2018**	**2017**	**2016**
Conversion and exchanges of convertible debt for common stock	$3,701	$8,652	$10,758
Cash paid for interest	1,945	2,554	3,694
Non-cash purchase of property, plant and equipment	919	27	513
Discount due to exchange of 2017 Notes for 2020 Notes	–	3,009	–
Fair value of 2020 Notes embedded derivative upon exchange	2,193	6,975	–
Fair value of warrants at issuance and upon exercise, net	$4,905	$(4,353)	$6,668

See the accompanying Notes to the Consolidated Financial Statements.

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GEVO, INC.

Notes to Consolidated Financial Statements

1. Nature of Business and Financial Condition

Nature of Business. Gevo, Inc. (“Gevo” or the “Company,” which, unless otherwise indicated, refers to Gevo, Inc. and its subsidiaries) is a renewable chemicals and next generation "low-carbon" fuel company focused on the development and commercialization of renewable alternatives to petroleum-based products. Low-carbon fuels reduce the carbon intensity, or the level of greenhouse gas emissions ("GHG"), compared to standard fossil-based fuels across their lifecycle. The most common low-carbon fuels are renewable fuels. Gevo is focused on the development and production of mainstream fuels like gasoline and jet fuel using renewable feedstocks that have the potential to lower GHG at a meaningful scale and enhance agricultural production, including food and other related products. In addition to serving the low-carbon fuel markets, through Gevo's technology, Gevo can also serve markets for the production of chemical intermediate products for solvents, plastics and building block chemicals.

In addition to its ethanol production capabilities, the Company developed proprietary technology that uses a combination of synthetic biology, metabolic engineering, chemistry and chemical engineering to make isobutanol and hydrocarbon products from isobutanol that can displace petrochemical incumbent products. The Company has been able to genetically engineer yeast, whereby the yeast produces isobutanol from carbohydrates. The Company’s technology converts its renewable isobutanol to alcohol-to-jet (“ATJ”), isooctane, isooctene, and para-xylene (building block for polyester) at its hydrocarbons demonstration plant located at South Hampton Resources located in Silsbee, Texas. In addition the Company’s production facility located in Luverne, Minnesota (the "Luverne Facility") has production capacity of about 20 million gallons per year of ethanol, 45-50 kilotons of animal feed, and 3 million pounds of corn oil.

As of December 31, 2018, the Company continues to engage in research and development, business development, business and financial planning, optimizing operations for low-carbon ethanol, isobutanol, and related hydrocarbons production and raising capital to fund future expansion of its Luverne Facility. Ultimately, the Company believes that the attainment of profitable operations is dependent upon future events, including (i) completing certain capital improvements at the Luverne Facility to produce low-carbon ethanol side-by-side with low-carbon isobutanol; (ii) completing the Company's development activities resulting in commercial production and sales of low-carbon ethanol, isobutanol, or isobutanol derived products and/or technology; (iii) obtaining adequate financing to complete the Company's development activities, including the build out of low-carbon ethanol capacity and further isobutanol and hydrocarbon capacity (iv) gaining market acceptance and demand for the Company's products and services; (v) attracting and retaining qualified personnel; and (vi) the achievement of a level of revenues adequate to support the Company's cost structure.

Financial Condition. For the year ended December 31, 2018 and 2017, the Company incurred a consolidated net loss of $28.0 million and $24.6 million, respectively, and had an accumulated deficit of $429.3 million at December 31, 2018. The Company's cash and cash equivalents at December 31, 2018 totaled $33.7 million and are expected to be used for the following purposes: (i) operating activities of the Luverne Facility; (ii) operating activities at the Company's corporate headquarters in Colorado, including research and development work; (iii) capital improvements primarily associated with the Luverne Facility; (iv) exploration of strategic alternatives and new financings; and (v) debt service obligations.

The Company expects to incur future net losses as it continues to fund the development and commercialization of its product candidates. To date, the Company has financed its operations primarily with proceeds from multiple sales of equity and debt securities, borrowings under debt facilities and product sales. The Company's transition to profitability is dependent upon, among other things, the successful development and commercialization of its product candidates and the achievement of a level of revenues adequate to support the Company's cost structure. The Company may never achieve profitability or positive cash flows, and unless and until it does, the Company will continue to need to raise additional cash. Management intends to fund future operations through additional private and/or public offerings of debt or equity securities. In addition, the Company may seek additional capital through arrangements with strategic partners or from other sources, it may seek to restructure its debt and it will continue to address its cost structure. Notwithstanding, there can be no assurance that the Company will be able to raise additional funds, or achieve or sustain profitability or positive cash flows from operations.

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GEVO, INC.

Notes to Consolidated Financial Statements (Continued)

At-the-Market Offering Program. In February 2018, the Company commenced an at-the-market offering program, which allowed it to sell and issue shares of its common stock. The at-the-market offering program was amended multiple times during 2018 to increase the available capacity under the at-the-market offering program by an aggregate of approximately $84.9 million. As of December 31, 2018, the Company has remaining capacity to issue and sell up to approximately $44.6 million of additional shares of common stock under the at-the-market offering program.

During the year ended December 31, 2018, the Company issued 6,936,930 shares of common stock (after giving effect to the Reverse Stock Split (as defined below) under the at-the-market offering program for gross proceeds of $40.3 million. The Company paid commissions to its sales agent of approximately $0.9 million and incurred other offering related expenses of $0.5 million during the year ended December 31, 2018. During the three months ended December 31, 2018, the Company issued 545,313 shares of common stock, for gross proceeds of $2.5 million. The Company paid commissions to its sales agent of approximately $0.1 million and incurred other offering related expenses of less than $0.1 million.

The Company issued and sold 3,244,941 shares of common stock under the at-the-market offering program, for gross proceeds of $9.9 million after December 31, 2018.

Reverse Stock Split. On June 1, 2018, the Company effected a reverse stock split of the outstanding shares of its common stock by a ratio of one-for-twenty (the "Reverse Stock Split"), and its common stock began trading on the Nasdaq Capital Market on a Reverse Stock Split-basis on June 4, 2018. Unless otherwise indicated, all share amounts, per share data, share prices, exercise prices and conversion rates set forth in these notes and the accompanying consolidated financial statements have, where applicable, been adjusted retroactively to reflect this Reverse Stock Split.

2. Summary of Significant Accounting Policies

Principles of Consolidation. The consolidated financial statements of Gevo include the accounts of its wholly-owned subsidiaries. All intercompany balances and transactions have been eliminated in consolidation.

Basis of Presentation. The consolidated financial statements of the Company (which include the accounts of its wholly-owned subsidiaries Gevo Development, LLC and Agri-Energy, LLC) have been prepared pursuant to the rules and regulations of the U.S. Securities and Exchange Commission (the "SEC") and accounting principles generally accepted in the U.S. ("GAAP") for complete financial statements. These statements reflect all normal and recurring adjustments which, in the opinion of management, are necessary to present fairly the financial position, results of operations and cash flows of the Company at December 31, 2018.

Use of Estimates. The preparation of financial statements in conformity with GAAP requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities at the date of the financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ materially from those estimates.

Concentrations of Credit Risk. The Company's financial instruments that are exposed to concentrations of credit risk consist of cash and cash equivalents in excess of the federally insured limits. The Company's cash and cash equivalents are deposited with high credit-quality financial institutions and are primarily in demand deposit accounts.

Cash and Cash Equivalents. The Company maintains its cash and cash equivalents in highly liquid interest bearing money market accounts or non-interest bearing demand accounts. The Company considers all highly liquid investments purchased with a maturity of three months or less at the date of acquisition to be cash equivalents.

Accounts Receivable. The Company records receivables for products shipped and services provided but for which payment has not yet been received. As of December 31, 2018 and 2017, no allowance for doubtful accounts has been recorded, based upon the expected full collection of the accounts receivable. As of December 31, 2018, one customer, Eco-Energy, LLC ("Eco-Energy"), comprised 66% of the Company's outstanding trade accounts receivable. As of December 31, 2017, one customer, C&N Ethanol Marketing, LLC ("C&N Ethanol"), comprised 78% of the Company's outstanding trade accounts receivable.

Inventories. Inventory is recorded at net realizable value per Accounting Standard Update ("ASU") 2015-11 and cost of goods sold is determined by average cost method. Ethanol and isobutanol inventory cost consists of the applicable share of raw material, direct labor and manufacturing overhead costs. Spare Parts inventory consists of the parts required to maintain and operate the Company's Luverne Facility and is recorded at cost.

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GEVO, INC.

Notes to Consolidated Financial Statements (Continued)

Derivative Instruments. The Company evaluates its contracts for potential derivatives which Gevo, Inc. uses to raise capital. See Note 7 for a description of the Company's accounting for embedded derivatives and Note 8 for a description of the Company's derivative warrant liability. At issuance date, derivative warrant liabilities are initially recognized as a liability with a corresponding reduction in stockholders' equity. Changes in the estimated fair value of the derivative warrant liability between issuance date and exercise/expiration date represents an unrealized (gain)/loss and is recognized and recorded in the *Consolidated Statement of Operations*. The fair value of the derivative warrant liability is ultimately either re-classed into equity upon either exercise or, if expired, a realized (gain)/loss is recognized and recorded in the *Consolidated Statement of Operation.*

As of December 31, 2018 and 2017, the Company did not have any forward purchase contracts or exchange-traded futures contracts outside those probable of being used by the Company over a reasonable period in the normal course of business.

Property, Plant and Equipment. Property, plant and equipment are recorded at cost less accumulated depreciation and amortization. Depreciation and amortization are computed using the straight-line method over the assets' estimated useful lives. Leasehold improvements are amortized over the term of the lease agreement or the service lives of the improvements, whichever is shorter. Assets under construction are depreciated when they are placed into service. Maintenance and repairs are charged to expense as incurred and expenditures for major improvements are capitalized.

Impairment of Property, Plant and Equipment. The Company's property, plant and equipment consist primarily of assets associated with the acquisition and retrofit of the Luverne Facility. The Company assesses impairment of property, plant and equipment for recoverability when events or changes in circumstances indicate that their carrying amount may not be recoverable. Circumstances which could trigger a review include, but are not limited to: significant decreases in the market price of the asset; significant adverse changes in the business climate, or legal or regulatory factors; accumulation of costs significantly in excess of the amount originally expected for the acquisition or construction of the asset; or expectations that the asset will more likely than not be sold or disposed of significantly before the end of its estimated useful life. The carrying amount of a long-lived asset is considered to be impaired if it exceeds the sum of the undiscounted cash flows expected to result from the use and eventual disposition of the assets.

The Company evaluated its Luverne Facility for impairment as of December 31, 2018 and 2017. These evaluations included comparing the carrying amount of the acquisition and retrofit of the Luverne Facility to the estimated undiscounted future cash flows at the Luverne Facility as this represents the lowest level of identifiable cash flows.

Significant assumptions included in the estimated undiscounted future cash flows include, among others, estimates of the:

- sales price of isobutanol, hydrocarbons, ethanol and by-products such as dried distiller's grains;
- purchase price of corn;
- production levels of isobutanol;
- capital and operating costs to produce isobutanol; and
- estimated useful life of the primary asset.

Factors which can impact these assumptions include, but are not limited to;

- effectiveness of the Company's technology to produce isobutanol at targeted margins;
- demand for isobutanol and oil prices; and
- harvest levels of corn.

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Based upon the Company's evaluation at December 31, 2018 and 2017, the Company concluded that the estimated undiscounted future cash flows from the Luverne Facility exceeded the carrying value and, as such, these assets were not impaired. Although the Company's cash flow forecasts are based on assumptions that are consistent with its planned use of the assets, these estimates required significant exercise of judgment and are subject to change in future reporting periods as facts and circumstances change. Additionally, the Company may make changes to its business plan that could result in changes to the expected cash flows. As a result, it is possible that a long-lived asset may be impaired in future reporting periods.

Debt Issue Costs. Debt issue costs are costs incurred in connection with the Company's debt financings have been capitalized and are being amortized over the stated maturity period or estimated life of the related debt, using the effective interest method.

Revenue Recognition. The Company records revenue from the sale of ethanol and related products, hydrocarbon products, and funding from government grants and cooperative agreements. The Company recognizes revenue when all of the following criteria are satisfied: (i) it has identified a contract with a customer; (ii) it has identified the performance obligations of the customer; (iii) it has determined the transaction price; (iv) it has allocated the transaction price to the identified performance obligations in the contract with the customer; and (v) satisfied each individual performance obligation with the contract with a customer.

Ethanol and related products as well as hydrocarbon products are generally shipped "free-on-board" shipping point. Collectability of revenue is reasonably assured based on historical evidence of collectability between the Company and its customers. In accordance with the Company's agreements for the marketing and sale of ethanol and related products, commissions due to marketers were deducted from the gross sales price at the time payment was remitted. Ethanol and related products sales were recorded net of commissions and shipping and handling costs.

Revenue related to government research grants and cooperative agreements is recognized in the period during which the related costs are incurred, provided that the conditions under the awards have been met and only perfunctory obligations are outstanding. Revenues related to the lease agreements are recognized on a straight-line basis over the term of the contract.

For the year ended December 31, 2018, Eco-Energy, accounted for approximately 72% of the Company's consolidated revenue. For the years ended December 31, 2017 and 2016, C&N Ethanol, accounted for approximately 76% and 71% of the Company's consolidated revenue, respectively. In the same years, Purina Animal Nutrition, LLC, formerly Land O'Lakes Purina Feed, LLC accounted for approximately 21%, 17% and 17% of the Company's consolidated revenue, respectively. All are customers of the Company's Gevo Development/Agri-Energy segment (see Note 18). Given the production capacity compared to the overall size of the North American market and the fungible demand for the Company's products, the Company does not believe that a decline in a specific customer's purchases would have a material adverse long-term effect upon the Company's financial results.

Cost of Goods Sold. Cost of goods sold includes costs incurred in conjunction with the operations for the production of isobutanol at the Luverne Facility and costs directly associated with the ethanol and related products production process such as costs for direct materials, direct labor and certain plant overhead costs. Costs associated with the operations for the production of isobutanol includes costs for direct materials, direct labor, plant utilities, including natural gas, and plant depreciation. Direct materials consist of dextrose for initial production of isobutanol, corn feedstock, denaturant and process chemicals. Direct labor includes compensation of personnel directly involved in production operations at the Luverne Facility. Costs of direct materials for the production of ethanol and related products consist of corn feedstock, denaturant and process chemicals. Direct labor includes compensation of personnel directly involved in the operation of the Luverne Facility. Plant overhead costs primarily consist of plant utilities and plant depreciation. Cost of goods sold is mainly affected by the cost of corn and natural gas. Corn is the most significant raw material cost. The Company purchases natural gas to power steam generation in the production process and to dry the distiller’s grains, a by-product of ethanol and related products production.

Patents. All costs related to filing and pursuing patent applications are expensed as incurred as recoverability of such expenditures is uncertain. Patent-related legal expenses incurred are recorded as selling, general and administrative expense, and during the years ended December 31, 2018, 2017 and 2016 were $0.2 million, $0.3 million, and $0.2 million, respectively.

Research and Development. Research and development costs are expensed as incurred and are recorded as research and development expense in the Consolidated Statement of Operations. The Company’s research and development costs consist of expenses incurred to identify, develop, and test its technologies for the production of isobutanol and the development of downstream applications thereof. Research and development expense includes personnel costs, consultants and related contract research, facility costs, supplies, depreciation on property, plant and equipment used in development, license fees and milestone payments paid to third parties for use of their intellectual property and patent rights, and other direct and allocated expenses incurred to support the Company’s overall research and development programs.

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Income Taxes. Deferred tax assets and liabilities are recognized based on the difference between the carrying amounts of assets and liabilities in the financial statements and their respective tax bases. Deferred tax assets and liabilities are measured using currently enacted tax rates in effect in the years in which those temporary differences are expected to reverse. Deferred tax assets should be reduced by a valuation allowance if, based on the weight of available evidence, it is more likely than not that some portion or all of the deferred tax assets will not be realized. At December 31, 2018 and 2017, based upon current facts and circumstances, the Company had recorded a valuation allowance against its deferred tax assets of $110.9 million and $107.4 million, respectively.

Stock-Based Compensation. The Company's stock-based compensation expense includes expenses associated with share-based awards granted to employees and board members, and expenses associated with awards under its employee stock purchase plan ("ESPP"). Stock-based compensation expense for all share-based payment awards granted is based on the grant date fair value. The grant date fair value for stock option awards is estimated using the Black-Scholes option pricing model and the grant date fair value for restricted stock awards is based upon the closing price of the Company's common stock on the date of grant. The Company recognizes compensation costs for share-based payment awards granted to employees net of estimated forfeitures and recognizes stock-based compensation expense for only those awards expected to vest on a straight-line basis over the requisite service period of the award, which is currently the vesting term of up to four years. For performance based restricted stock awards, the Company recognizes expense over the requisite service period.

Net Loss Per Share. Basic net loss per share is computed by dividing the net loss attributable to Gevo, Inc. common stockholders for the period by the weighted-average number of common shares outstanding during the period. Diluted earnings per share ("EPS") includes the dilutive effect of common stock equivalents and is computed using the weighted-average number of common stock and common stock equivalents outstanding during the reporting period. Diluted EPS for the years ending December 31, 2018, 2017, and 2016 excluded common stock equivalents because the effect of their inclusion would be anti-dilutive, or would decrease the reported loss per share.

The following table sets forth securities that could potentially dilute the calculation of diluted earnings per share. This table excludes any shares that could potentially be issued in settlement of make-whole payments associated with the 2020 and the 2022 Notes.

	Year Ended December 31,		
	2018	2017	2016

Warrants to purchase common stock - liability classified	55,963	359,619	55,119
Warrants to purchase common stock - equity classified	6	70	70
Convertible 2017 Notes	–	–	3,756
Convertible 2020 Notes	1,071,674	1,437,984	–
Convertible 2022 Notes	–	–	280
Outstanding options to purchase common stock	2,311	2,322	846
Unvested restricted common stock	290,300	155	441
Stock a ppreciation rights	132,559	–	–
Total	1,552,813	1,800,150	60,512

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Recent Accounting Pronouncements

Leases ("ASU 2016-02"). In February 2016, the Financial Accounting Standards Board ("FASB") issued ASU *No. 2016-02, Topic 842 Leases*. ASU 2016-02 requires leases to be reported on the financial statements. The objective is to increase transparency and comparability among organizations by recognizing lease assets and lease liabilities on the balance sheet and disclosing key information about leasing arrangements. ASU 2016-02 is effective for fiscal years beginning after December 15, 2018, including interim periods within those fiscal years. Future minimum lease obligations for leases accounted for as operating leases at December 31, 2018 totaled $2.2 million. The standard requires using the modified retrospective transition method and apply ASU 2016-02 either at (i) latter of the earliest comparative period presented in the financial statements or commencement date of the least, or (ii) the beginning of the period of adoption. The Company has elected to apply the standard at the beginning period of adoption, January 1, 2019 with a cumulative adjustment to retained earnings, if any, as opposed to retrospectively adjusting prior periods presented in the financial statements.

While the Company has not yet completed its evaluation, it anticipates that the adoption of ASU 2016-02 will require the Company to recognize between $1 - $1.5 million of right-to-use assets and related lease liabilities. The Company has not yet completed the determination whether leases qualify as (i) operating or (ii) financing under the new standard. The Company has elected to apply the short-term lease scope exception for leases with terms of 12 months or less, and will continue to recognize rent expense on a straight-line basis.

Derivatives and Hedging (Topic 815). Accounting for Certain Financial Instruments with Down Round Provisions ("ASU 2017-11"). In July 2017, the FASB issued ASU No. 2017 - 11, *Derivatives and Hedging (Topic 815) Accounting for Certain Financial Instruments with Down Round Provisions* which simplifies the accounting for certain equity-linked financial instruments and embedded features with down round features that reduce the exercise price when the pricing of a future round of financing is lower. Currently, the existence of such features require classification outside of equity and recognition of changes in the fair value of the instrument in earnings each reporting period. This standard eliminates the need to remeasure the instruments at fair value and allows classification within equity. This standard will *not* materially impact the Company, as the Company's liability classified financial instruments and embedded derivatives that require separation from the host instrument have features other than down-round provisions that require current accounting and classification.

Adoption of New Accounting Pronouncements.

Revenue from Contracts with Customers ("ASU 2014-09"). In May 2014, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update No. 2014-09, *Revenue from Contracts with Customers* . The objective of ASU 2014-09 is to outline a new, single comprehensive model to use in accounting for revenue arising from contracts with customers. The new revenue recognition model provides a five-step analysis for determining when and how revenue is recognized, depicting the transfer of promised goods or services to customers in an amount that reflects the consideration that is expected to be received in exchange for those goods or services. ASU 2014-09 is effective for fiscal years and interim periods within those years beginning after December 15, 2017. In April 2016, the FASB issued *ASU No. 2016-10 Revenue from Contracts with Customers, Identifying Performance Obligations and Licensing* which provides additional clarification regarding *Identifying Performance Obligations and Licensing.* The new standard required either (i) application retrospectively to each prior reporting period presented or (ii) retrospectively with the cumulative effect of initially applying it recognized at the date of initial application. As a result of the Company's conclusions below, there was no requirement to select a transition method as the Company determined there is no impact to revenue recognition, historical or otherwise, as a result of adopting ASU 2014-09. The Company adopted this standard effective January 1, 2018.

The Company's current and historical revenues have consisted of the following: (a) ethanol sales and related products revenue, net; (b) hydrocarbon revenue; and (c) grant and other revenue, which primarily has historically consisted of revenues from governmental and cooperative research grants. The following provides the Company's initial assessment on how this standard will impact the aforementioned sources of revenue.

Ethanol sales and related products revenues, net. Ethanol sales and related products revenues, net are sold to customers primarily on a "free-on-board, shipping point" basis. Each transaction occurs independent of any other sale, and once sold, there are no future obligations on the part of the Company to provide post-sale support or promises to deliver future goods or services. The Company has and continues to sell close to 100 percent of its ethanol production to a single customer for the years ended December 31, 2018, 2017 and 2016 representing 72%, 76% and 71% of total revenues for the year ended December 31, 2018, 2017 and 2016, respectively. Upon completion of the Company's review of these sales, and consistent with prior assessments, there is no impact on how the Company accounted for sales of ethanol during the years ended December 31, 2018, 2017 and 2016. The Company further evaluated related products, including distiller's grains and corn oil, and after its review, and there was no significant impact to how the Company accounts for or discloses these revenues streams.

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Hydrocarbon revenue. Hydrocarbon revenues include sales of alcohol-to-jet fuel, isooctene and isooctane and is sold mostly on a “free-on-board, shipping point” or "free-on-board, destination" basis. Each transaction occurs independent of any other sale, and once sold, there are no future obligations on the part of the Company to provide post-sale support or promises to deliver future goods or services. There was no material impact as to how the Company recognized these revenues prior to adoption of ASU 2014-09 or will now recognize these revenues upon adoption of this standard effective January 1, 2018.

Grant and other revenues. Grant and other revenues primarily have consisted of governmental and cooperative research grants, of which the *Northwest Advanced Renewables Alliance* (“NARA”) grant, funded by the United States Department of Agriculture (“USDA”), comprised the majority of those revenues since 2014. After reviewing this arrangement, the Company concluded that this grant consists of a non-reciprocal arrangement, and therefore, does not qualify as a contract pursuant to Topic 606 “ *Revenues from Contracts with Customers”*, which was established with the issuance of ASU 2014-09. However, such arrangements remain in-scope pursuant to Topic 606, and the Company determined that there was no change to revenues recognition upon adoption of ASU 2014-09.

Statement of Cash Flows – Restricted Cash (“ASU 2016-18”). In November 2016, the FASB issued Accounting Standards Update No. 2016-18, *Statement of Cash Flows Restricted Cash* which standardizes the classification and presentation of changes in restricted cash on the statement of cash flows. This amendment requires that that a statement of cash flows explain the change during the period in the total of cash, cash equivalents, and amounts generally described as restricted cash or restricted cash equivalents. This amendment is effective for public business entities for fiscal years beginning after December 15, 2017. This standard required retrospective presentation for all periods presented. Adoption of this standard materially impacted the presentation of the Company’s historical statement of cash flow due to the existence of approximately $2.6 million in restricted cash deposits relating to the former 2017 Notes, which were exchanged for the 2020 Notes in June 2017 (see Note 9). However, this standard will not materially impact the Company prospectively as a result of the release of the restricted cash in April 2017 due to an amendment to the 2017 Notes and the Company no longer holds any cash in which use is restricted by contract or regulation.

3. Revenues from Contracts with Customers Other Revenues

The Company's current and historical revenues have consisted of the following: (a) ethanol sales and related products revenue, net; (b) hydrocarbon revenue; and (c) grant and other revenue, which primarily has historically consisted of revenues from governmental and cooperative research grants.

Ethanol sales and related products revenues, net. Ethanol sales and related products revenues, net are sold to customers on a "free-on-board, shipping point" basis. Each transaction occurs independent of any other sale, and once sold, there are no future obligations on the part of the Company to provide post-sale support or promises to deliver future goods or services.

Hydrocarbon revenue. Hydrocarbon revenues include sales of ATJ, isooctene and isooctane and are sold mostly on a "free-on-board, shipping point" basis. Each transaction occurs independent of any other sale, and once sold, there are no future obligations on the part of the Company to provide post-sale support or promises to deliver future goods or services.

Grant and other revenues. Grant and other revenues primarily have historically consisted of governmental and cooperative research grants, of which the NARA grant, funded by the USDA, comprised the majority of those revenues since 2014. After reviewing this arrangement, the Company has concluded that this grant consists of a non-reciprocal arrangement, and therefore, does not qualify as a contract pursuant to Topic 606 "*Revenues from Contracts with Customers"*. Other revenues also include occasional short-term (less than one-year) consulting services and until December 2017, the lease of the Company's corn storage bins at its Luverne, Minnesota facility.

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Notes to Consolidated Financial Statements (Continued)

The following table sets forth the components of the Company's revenues between those generated from contracts with customers and those generated from arrangements that do not constitute a contract with a customer (in thousands):

Major Goods/Service Line	Year Ended December 31, 2018 Revenues from Contracts with Customers	Other Revenues	Total
Ethanol sales and related products, net	$31,641	$ -	$31,641
Hydrocarbon revenue	1,197	-	1,197
Grant and other revenue	25	-	25
	$32,863	$ -	$32,863
Timing of Revenue Recognition			
Goods transferred at a point in time	$32,838	$ -	$32,838
Services transferred over time	25	-	25
	$32,863	$ -	$32,863
Operating Segment			
Gevo	$1,222	$ -	$1,222
Gevo Development / Agri-Energy	31,641	-	31,641
	$32,863	$ -	$32,863
Geographic Region			
United States	$31,688	$ -	$31,688
Other	1,176	-	1,176
	$32,863	$ -	$32,863

Major Goods/Service Line	Year Ended December 31, 2017 Revenues from Contracts with	Other Revenues	Total

	Customers		
Ethanol sales and related products, net	$26,279	$ -	$26,279
Hydrocarbon revenue	1,029	-	1,029
Grant and other revenue	-	228	228
	$27,308	$ 228	$27,536
Timing of Revenue Recognition			
Goods transferred at a point in time	$27,308	$ -	$27,308
Services transferred over time	-	228	228
	$27,308	$ 228	$27,536
Operating Segment			
Gevo	$1,029	$ 68	$1,097
Gevo Development / Agri-Energy	26,279	160	26,439
	$27,308	$ 228	$27,536
Geographic Region			
United States	$26,324	$ 228	$26,552
Other	984	-	984
	$27,308	$ 228	$27,536

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Notes to Consolidated Financial Statements (Continued)

	Year Ended December 31, 2016		
Major Goods/Service Line	**Revenues from Contracts with Customers**	**Other Revenues**	**Total**
Ethanol sales and related products, net	$24,613	$ -	$24,613
Hydrocarbon revenue	1,929	-	1,929
Grant and other revenue	-	671	671
	$26,542	$ 671	$27,213
Timing of Revenue Recognition			
Goods transferred at a point in time	$26,542	$ -	$26,542
Services transferred over time	-	671	671
	$26,542	$ 671	$27,213
Operating Segment			
Gevo	$1,929	$ 496	$2,425
Gevo Development / Agri-Energy	24,613	175	24,788
	$26,542	$ 671	$27,213
Geographic Region			
United States	$24,654	$ 671	$25,325
Other	1,889	-	1,889
	$26,542	$ 671	$27,213

Goods transferred at a point-in-time. For the years ended December 31, 2018, 2017 and 2016, respectively, there were no contracts with customers for which consideration was variable or for which there were multiple performance obligations for any given contract. Accordingly, the entire transaction price is allocated to the goods transferred. As of December 31, 2018, 2017, and 2016, respectively, there were no remaining unfulfilled or partially fulfilled performance obligations.

All goods transferred are tested to ensure product sold satisfies contractual product specifications prior to transfer. The customer obtains control of the goods when title and risk of loss for the goods has transferred, which in most cases is "*free-on-board, shipping point*". All material contracts have payment terms of between one to three months, and there

are no return or refund rights.

Services transferred over time. For the years ended December 31, 2018, 2017 and 2016, respectively, there were no contracts for which consideration was variable or for which there were multiple performance obligation for any given contract. Accordingly, the entire transaction price is allocated to the individual service performance obligation. As of December 31, 2018, 2017, and 2016, respectively, there were no material unfulfilled or partially fulfilled performance obligations.

For the years ended December 2018, 2017 and 2016, respectively, revenues were recognized ratably over time, as the performance obligation was satisfied and benefit to the customer was transferred on a ratable basis over time.

Contract Assets and Trade Receivables. As of December 31, 2018, 2017 and 2016, respectively, there were no contract assets or liabilities as all customer amounts owed to the Company are unconditional and the Company does not receive payment in advance for its products. Accordingly, amounts owed by customers are classified as account receivables on the Company’s consolidated balance sheets. In addition, due to the nature of the Company’s contracts, there are no costs incurred or to be paid in the future that qualify for asset recognition as a cost to fulfill or obtain a contract. The Company did not incur any impairment losses on any receivables as all amounts owed were paid or current as of December 31, 2018, 2017 or 2016, respectively.

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Notes to Consolidated Financial Statements (Continued)

4. Inventories

The following table sets forth the components of the Company's inventory balances (in thousands).

	December 31,	
	2018	**2017**
Raw materials		
Corn	$29	$189
Enzymes and other inputs	204	202
Nutrients	-	5
Finished goods		
Ethanol	182	222
Isobutanol	549	1,122
Jet Fuels, Isooctane and Isooctene	394	524
Distiller's grains	54	59
Work in process - Agri Energy	214	197
Work in process - Gevo	89	437
Spare parts	1,451	1,405
Total inventories	$3,166	$4,362

Work in process inventory includes unfinished jet fuel, isooctane, and isooctene inventory.

5. Property, Plant and Equipment

The following table sets forth the Company's property, plant and equipment by classification (in thousands).

December 31,

	(in years)	2018	2017
Construction in progress	–	$3,478	$479
Plant machinery and equipment	10	16,285	16,284
Site improvements	10	7,055	7,051
Agri-Energy Retrofit asset	20	70,842	70,842
Lab equipment, furniture and fixtures and vehicles	5	6,574	6,513
Demonstration plant	2	3,597	3,597
Buildings	10	2,543	2,543
Computer, office equipment and software	3	1,848	1,795
Leasehold improvements, pilot plant, land and support equipment	2—5	2,542	2,536
Total property, plant and equipment		114,764	111,640
Less accumulated depreciation and amortization		(47,728)	(41,271)
Property, plant and equipment, net		$67,036	$70,369

The Company had no outstanding capital lease obligations as of December 31, 2018 and 2017, respectively.

The Company recorded $6.5 million, $6.6 million, and $6.7 million of depreciation expense for the years ended December 31, 2018, 2017, and 2016, respectively, including $6.3 million, $6.2 million, and $6.0 million of depreciation expense in cost of goods sold for the years ended December 31, 2018, 2017 and 2016 respectively.

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Notes to Consolidated Financial Statements (Continued)

6. Accounts Payable and Accrued Liabilities

The following table sets forth the components of the Company's accounts payable and accrued liabilities in the consolidated balance sheets (in thousands).

	December 31,	
	2018	**2017**
Accounts payable - trade	$1,944	$666
Accrued legal-related fees	206	274
Accrued employee compensation	1,648	700
Accrued interest	-	434
Accrued production fees	255	447
Accrued utilities payable	344	677
Accrued taxes payable	101	172
Customer deposit	-	436
Other accrued liabilities *	376	205
Total accounts payable and accrued liabilities	$4,874	$4,011

* Other accrued liabilities consist of franchise taxes, audit fees, and a variety of other expenses, none of which individually represent greater than five percent of total current liabilities.

7. Embedded Derivatives

2020 Notes Embedded Derivative

In June 2017, the Company issued its 12% convertible senior secured notes due 2020 (the "2020 Notes") in exchange for its 12.0% convertible senior secured notes due 2017 (the "2017 Notes"). The 2020 Notes contain the following embedded derivatives: (i) a Make-Whole Payment (as defined in the indenture governing the 2020 Notes (the "2020

Notes Indenture")) upon either conversion or redemption; (ii) right to redeem the outstanding principal upon a Fundamental Change (as defined in the 2020 Notes Indenture); (iii) issuer rights to convert into a limited number of shares in any given three-month period commencing nine -months from the issuance date and dependent on the stock price exceeding 150% of the then in-effect conversion price over a ten-business day period; and (iv) holder rights to convert into either shares of the Company's common stock or pre-funded warrants upon the election of the holders of the 2020 Notes.

Embedded derivatives are separated from the host contract and the 2020 Notes, and carried at fair value when: (a) the embedded derivative possesses economic characteristics that are not clearly and closely related to the economic characteristics of the host contract; and (b) a separate, stand-alone instrument with the same terms would qualify as a derivative instrument. The Company has concluded that certain embedded derivatives within the 2020 Notes meet these criteria and, as such, must be valued separate and apart from the 2020 Notes as one embedded derivative and recorded at fair value each reporting period.

The Company used a binomial lattice model in order to estimate the fair value of the embedded derivative in the 2020 Notes. A binomial lattice model generates two probable outcomes, whether up or down, arising at each point in time, starting from the date of valuation until the maturity date. A lattice was initially used to determine if the 2020 Notes would be converted by the holder, called by the issuer, or held at each decision point. Within the lattice model, the following assumptions are made: (i) the 2020 Notes will be converted by the holder if the conversion value plus the holder's Make-Whole Payment is greater than the holding value; or (ii) the 2020 Notes will be called by the issuer if (a) the stock price exceeds 150% of the then in-effect conversion price over a ten-business day period and (b) if the holding value is greater than the conversion value plus the Make-Whole Payment at the time.

Using this lattice model, the Company valued the embedded derivative using a "with-and-without method", where the value of the 2020 Notes including the embedded derivative is defined as the "with", and the value of the 2020 Notes excluding the embedded derivative is defined as the "without". This method estimates the value of the embedded derivative by comparing the difference in the values between the 2020 Notes with the embedded derivative and the value of the 2020 Notes without the embedded derivative. The lattice model requires the following inputs: (i) price of Gevo common stock; (ii) Conversion Rate (as defined in the 2020 Notes Indenture); (iii) Conversion Price (as defined in the 2020 Notes Indenture); (iv) maturity date; (v) risk-free interest rate; (vi) estimated stock volatility; and (vii) estimated credit spread for the Company.

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Upon issuance on June 20, 2017, the fair value of the embedded derivative was valued at $7.0 million. As of December 31, 2018, the estimated fair value of the embedded derivatives was $0.4 million. The Company recorded a $2.6 million gain to reflect the change in fair value of the embedded derivative in the consolidated statements of operations for the year-ended December 31, 2018. The Company recorded the estimated fair value of the embedded derivative as a component of current liabilities in the consolidated balance sheet.

The following table sets forth the inputs to the lattice model that were used to value the embedded derivatives.

	December 31, 2018		**December 31,, 2017**	
Stock price	$1.96		$11.80	
Conversion Rate	67.95		1,358.90	
Conversion Price	$14.72		$14.72	
Maturity date	March 15, 2020		March 15, 2020	
Risk-free interest rate	2.57	%	1.89	%
Estimated stock volatility	150	%	75	%
Estimated credit spread	31	%	28	%

Changes in certain inputs into the lattice model can have a significant impact on changes in the estimated fair value of the embedded featured within the 2020 Notes. For example, the estimated fair value will generally decrease with: (1) a decline in the stock price; (2) decreases in the estimated stock volatility; and (3) a decrease in the estimated credit spread.

2022 Notes Embedded Derivative

In July 2012, the Company issued 7.5% convertible senior notes due July 2022 (the “2022 Notes”), which contained the following embedded derivatives: (i) rights to convert into shares of the Company’s common stock, including upon a Fundamental Change (as defined in the indenture governing the 2022 Notes (the “2022 Notes Indenture”)); and (ii) a Coupon Make-Whole Payment (as defined in the 2022 Notes Indenture) in the event of a conversion by the holders of the 2022 Notes prior to July 1, 2017.

The Company had concluded that the embedded derivatives within the 2020 Notes required separation from the host instrument and was re-valued each reporting period, with changes in the fair value of the embedded derivative recognized as a component of the Company's consolidated Statements of Operations. As of December 31, 2018, the fair value of the 2022 Notes embedded derivative was zero. In January 2018, the Company entered into a private exchange agreement with a holder of the 2022 Notes to exchange the remaining $0.5 million of outstanding principal amount of the 2022 Notes for 39,016 shares of common stock. Upon completion of this exchange, the 2022 Notes were satisfied in their entirety and there are no remaining obligations under the 2022 Notes, including any remaining obligations under the 2022 Notes embedded derivative.

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GEVO, INC.

Notes to Consolidated Financial Statements (Continued)

8. Derivative Warrant Liability

The following sets forth information pertaining to shares underlying warrants outstanding as of December 31, 2018:

	Issuance Date	Expiration Date	Exercise Price as of December 31, 2018	Shares Underlying Warrants on Issuance Date	Shares Issued upon Warrant Exercises as of December 31, 2018	Shares Underlying Warrants Outstanding as of December 31, 2018 (1)
2014 Warrants	08/05/2014	08/05/2019	$ 65.50	2,500	1,526	974
Series A Warrants	02/03/2015	02/03/2020	$ 3.80	5,542	5,222	320
Series C Warrants	05/19/2015	05/19/2020	$ 53.43	1,075	–	1,075
Series D Warrants	12/11/2015	12/11/2020	$ 40.00	25,125	25,078	47
Series F Warrants	04/01/2016	04/01/2021	$ 40.00	25,733	11,692	14,041
Series I Warrants	09/13/2016	09/13/2021	$ 220.00	35,650	–	35,650
Series K Warrants	02/17/2017	2/17/2022	$ 3.80	312,516	308,660	3,856
				408,141	352,178	55,963

(1) This table does not include equity-classified warrants issued in 2011, to purchase 6 shares of common stock with a strike price of $345 per share.

The agreements governing the above warrants include the following terms:

- certain warrants have exercise prices which are subject to adjustment for certain events, including the issuance of stock dividends on the Company's common stock and, in certain instances, the issuance of the Company's common stock or instruments convertible into the Company's common stock at a price per share less than the exercise price of the respective warrants;

- warrant holders may exercise the warrants through a cashless exercise if, and only if, the Company does not have an effective registration statement then available for the issuance of the shares of its common stock. If an effective registration statement is available for the issuance of its common stock, a holder may only exercise the warrants through a cash exercise;

- the exercise price and the number and type of securities purchasable upon exercise of the warrants are subject to adjustment upon certain corporate events, including certain combinations, consolidations, liquidations, mergers, recapitalizations, reclassifications, reorganizations, stock dividends and stock splits, a sale of all or substantially all of the Company's assets and certain other events; and

- in the event of an extraordinary transaction (as defined in the respective warrant agreements), generally including any merger with or into another entity, sale of all or substantially all of the Company's assets, tender offer or exchange offer, or reclassification of its common stock, in which the successor entity (as defined in the respective warrant agreements) that assumes the warrant is not a publicly traded company, the Company or any successor entity will pay the warrant holder, at such holder's option, exercisable at any time concurrently with or within 30 days after the consummation of the extraordinary transaction, an amount of cash equal to the value of such holder's warrants as determined in accordance with an appropriate valuation model and the terms of the respective warrant agreement.

Based on these terms, the Company has determined that all warrants issued since 2013 (the "Warrants") qualify as derivatives and, as such, are presented as a derivative warrant liability on the consolidated balance sheets and recorded at fair value each reporting period. The fair value of the Warrants was estimated to be $0.02 and $2.0 million as of December 31, 2018 and December 31, 2017, respectively. The decrease in the estimated fair value of the Warrants outstanding as of December 31, 2018 represents an unrealized gain which has been recorded as a gain from the change in fair value of derivative warrant liability in the consolidated statements of operations.

During the twelve months ended December 31, 2018, common stock was issued as a result of exercise of Warrants as described below:

	Twelve Months Ended December 31, 2018	
	Common Stock Issued	**Proceeds**
Series A Warrants	251	1,054
Series K Warrants	300,660	1,262,712

300,911 $1,263,766

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Notes to Consolidated Financial Statements (Continued)

9. Debt

2020 Notes

The following table sets forth information pertaining to the 2020 Notes which is included in the Company's consolidated balance sheets (in thousands).

	Principal Amount of 2020 Notes	Debt Discount	Debt Issue Costs	Total 2020 Notes	2020 Notes Embedded Derivative	Total 2020 Notes and 2020 Notes Embedded Derivative
Balance - December 31, 2017	$ 16,657	$ (2,501)	$ (665)	$ 13,491	$ 5,224	$ 18,715
Amortization of debt discount	-	1,094	-	1,094	-	1,094
Amortization of debt issue costs	-	-	309	309	-	309
Paid-in-kind interest	304	-	-	304	-	304
Change in fair value of 2020 Notes embedded derivative	-	-	-	-	(2,637)	(2,637)
Conversion of 2020 Notes into common stock	(3,186)	428	114	(2,644)	(2,193)	(4,837)
Balance - December 31,2018	$ 13,775	$ (979)	$ (242)	$ 12,554	$ 394	$ 12,948

On April 19, 2017, the Company entered into an Exchange and Purchase Agreement (the "Purchase Agreement") with WB Gevo, LTD (the "Holder") the holder of the 2017 Notes, which were issued under that certain Indenture dated as of June 6, 2014, by and among the Company, the guarantors party thereto, and Wilmington Savings Fund Society, FSB, as trustee and as collateral trustee (as supplemented, the "2017 Notes Indenture"), and Whitebox Advisors LLC, in its capacity as representative of the Holder ("Whitebox"). Pursuant to the terms of the Purchase Agreement, the Holder,

subject to certain conditions, including approval of the transaction by the Company's stockholders (which was received on June 15, 2017), agreed to exchange all of the outstanding principal amount of the 2017 Notes for an equal principal amount of the 2020 Notes, plus an amount in cash equal to the accrued and unpaid interest (other than interest paid in kind) on the 2017 Notes (the "Exchange"). Pursuant to the Purchase Agreement, the Company also granted the Holder an option (the "Purchase Option") to purchase up to an additional aggregate principal amount of $5.0 million of 2020 Notes (the "Option Notes"), at a purchase price equal to the aggregate principal amount of such Option Notes purchased, having identical terms (other than with respect to the issue date and restrictions on transfer relating to compliance with applicable securities law) to the 2020 Notes issued, at any time on or within ninety (90) days of the closing of the Exchange. The right to purchase Option Notes expired as of September 30, 2017. On June 20, 2017, the Company completed the Exchange, terminated the 2017 Notes Indenture and cancelled the 2017 Notes. The Company recognized an approximately $4.0 million loss which has been recorded as loss on exchange or conversion of debt within the consolidated statements of operations.

The 2020 Notes will mature on March 15, 2020 and are secured by a first lien on substantially all of the Company's assets. The 2020 Notes bear interest at a rate equal to 12% per annum (with 2% potentially payable as PIK Interest (as defined and described below) at the Company's option), payable on March 31, June 30, September 30, and December 31 of each year. Under certain circumstances, the Company has the option to pay a portion of the interest due on the 2020 Notes by either (a) increasing the principal amount of the 2020 Notes by the amount of interest then due or (b) issuing additional 2020 Notes with a principal amount equal to the amount of interest then due (interest paid in the manner set forth in (a) or (b) being referred to as "PIK Interest"). In the event the Company pays any portion of the interest due on the 2020 Notes as PIK Interest, the maximum aggregate principal amount of 2020 Notes that could be convertible into shares of the Company's common stock will be increased. Additional shares of the Company's common stock may also become issuable pursuant to the 2020 Notes in the event the Company is required to make certain make-whole payments as provided in the 2020 Notes Indenture.

The 2020 Notes are convertible into shares of the Company's common stock, subject to certain terms and conditions. The initial conversion price of the 2020 Notes is equal to $14.72 per share of common stock, or 0.0679 shares of common stock per $1 principal amount of 2020 Notes (the "Conversion Price").

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GEVO, INC.

Notes to Consolidated Financial Statements (Continued)

Each Holder has agreed not to convert its 2020 Notes into shares of Company common stock to the extent that, after giving effect to such conversion, the number of shares of common stock beneficially owned by such Holder and its affiliates would exceed 4.99% of Company common stock outstanding at the time of such conversion (the "4.99% Ownership Limitation"); provided that a Holder may, at its option and upon sixty-one (61) days' prior notice to the Company, increase such threshold to 9.99% (the "9.99% Ownership Limitation"). If a conversion of 2020 Notes by Whitebox would exceed the 4.99% Ownership Limitation or the 9.99% Ownership Limitation, as applicable, the Purchase Agreement contains a provision granting the holder a fully funded prepaid warrant for such common stock with a term of nine months, subject to a 6 month extension, which it can draw down from time to time.

Other than as set forth in the Reset Provision, the 2020 Notes do not contain any anti-dilution adjustments for future equity issuances that are below the Conversion Price, and adjustments to the Conversion Price will only generally be made in the event that there is a dividend or distribution paid on shares of the Company's common stock, a subdivision, combination or reclassification of the Company's common stock, or at the discretion of the Board of Directors of the Company in limited circumstances and subject to certain conditions.

Under certain circumstances, the Company may file one or more registration statements on Form S-3 or amend filings in order to register shares of common stock for sale or resale, as necessary in connection with the 2020 Notes.

2022 Notes

The following table sets forth information pertaining to the 2022 Notes, which is included in the Company's consolidated balance sheets (in thousands).

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Notes to Consolidated Financial Statements (Continued)

	Principal Amount of 2022 Notes	Total
Balance - December 31, 2017	$ 515	$515
Exchange of 2022 Notes	(515)	(515)
Balance - December 31, 2018	$ -	$-

In July 2012, the Company sold $45.0 million in aggregate principal amount of 2022 Notes, for net proceeds of $40.9 million, after accounting for $2.7 million and $1.4 million of discounts and issue costs, respectively. The 2022 Notes bear interest at 7.5% which is to be paid semi-annually in arrears on January 1 and July 1 of each year. The 2022 Notes were scheduled to mature on July 1, 2022, unless earlier repurchased, redeemed or converted. During the year ended December 31, 2018, 2017 and 2016, the Company recorded:

$0.0 million, $0.2 million and $4.0 million, respectively, of expense related to the amortization of debt discounts and issue costs,
$.02 million, $1.2 million and $2.5 million, respectively, of expense related to the exchange of debt,
$0.0 million, $0.05 million, and $1.2 million, respectively, of interest expense related to the 2022 Notes.

The amortization of debt issue costs, debt discounts and cash interest are included as a component of interest expense in the consolidated statements of operations. The Company amortizes debt discounts and debt issue costs associated with the 2022 Notes using an effective interest rate of approximately 40% from the issuance date through July 1, 2017, a five-year period, which represents the date the holders can require the Company to repurchase the 2022 Notes.

In the first quarter of 2018, the Company issued an aggregate 39,016 shares in exchange for the redemption of the remaining $515,000 in outstanding 2022 Notes.

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Notes to Consolidated Financial Statements (Continued)

10. Equity Incentive Plans

2006 Omnibus Securities and Incentive Plan. During 2006, the Company established the Gevo, Inc. 2006 Omnibus Securities and Incentive Plan (the “2006 Plan”). Pursuant to the 2006 Plan, the Company granted stock awards to employees and directors of the Company. Upon adoption of the Gevo, Inc. 2010 Stock Incentive Plan (as amended and restated, the “2010 Plan”), no further grants can be made under the 2006 Plan. At December 31, 2018, there were no remaining shares available for future grants of stock awards. To the extent outstanding awards under the 2006 Plan expire, or are forfeited, cancelled, settled, or become unexercisable without the issuance of shares, the shares of common stock subject to such awards will be available for future issuance under the 2010 Plan.

2010 Stock Incentive Plan. In February 2011, the Company’s stockholders approved the 2010 Plan, which was subsequently amended in June 2013, and amended and restated in July 2015, June 2016, November 2016 and May 2018, and provides for the grant of non-qualified stock options, incentive stock options, stock appreciation rights, restricted stock, restricted stock units and other equity awards to employees and directors of the Company. Stock options granted under the 2010 Plan have an exercise price that is at least equal to the fair market value of the Company’s common stock on the date the stock option is granted and expire ten years after the date of grant. At December 31, 2018, a total of 290,300 shares of Gevo common stock were reserved for issuance upon the exercise of outstanding stock option awards under the 2010 Plan, and an additional 2,630 shares were available for grant.

Employee Stock Purchase Plan. In February 2011, the Company’s stockholders approved the Employee Stock Purchase Plan (the "ESPP"). The offering periods for the ESPP are from January 1 to June 30 and from July 1 to December 31 of each calendar year. The Company has reserved 190 shares of common stock for issuance under the ESPP, of which 190 shares as of December 31, 2018 are available for future issuance. The purchase price of the common stock under the ESPP is 85% of the lower of the fair market value of a share of common stock on the first or last day of the purchase period. There were no purchases of common stock under the ESPP during 2018.

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Notes to Consolidated Financial Statements (Continued)

11. Stock-Based Compensation

Stock-Based Compensation Expense. The following table sets forth the Company's stock-based compensation expense (in thousands).

	Year Ended December 31,		
	2018	**2017**	**2016**
Stock options and ESPP awards			
Research and development	$21	$37	$62
Selling, general and administrative	48	122	321
Restricted stock awards			
Research and development	-	12	116
Selling, general and administrative	-	17	143
Restricted stock units			
Research and development	85	70	28
Selling, general and administrative	417	163	216
Stock appreciation rights			
Research and Development	61	-	-
Selling, general and adminstrative	51	-	-
Total stock-based compensation	$683	$421	$886

Determining Fair Value of Share-Based Payment Awards.

The following table sets forth the Black-Scholes option pricing model assumptions and resulting grant date fair value for stock options granted. There were no stock options granted during the year ended December 31, 2018.

	Year Ended December 31,

	2018	2017	2016
Risk-free interest rate	–	2.01 %	1.49 %
Expected dividend yield	–	None	None
Expected volatility factor	–	119.00%	106.70%
Expected option life (in years)	–	5.77	5.77
Weighted average grant date fair value	$–	$0.86	$5.66

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GEVO, INC.

Notes to Consolidated Financial Statements (Continued)

Due to the Company's limited history of grant activity, the expected life of options granted was estimated using the "simplified method" in accordance with SEC Staff Accounting Bulletin 110, where the expected life equals the arithmetic average of the vesting term and the original contractual term of the options. The volatility factor was determined based upon management's estimate using inputs from comparable public companies. The risk-free interest rate assumption is determined based upon observed interest rates appropriate for the expected term of the Company's employee stock options. The dividend yield assumption is based on the Company's history of dividend payouts.

An annual forfeiture rate is estimated at the time of grant for all share-based payment awards, and revised, if necessary, in subsequent periods if the actual forfeiture rate differs from the Company's estimate. Forfeitures have been estimated by the Company based upon historical and expected forfeiture experience. Estimated forfeiture rates used for the periods presented were from 0% to 5%.

Stock Option Award Activity. Stock option activity under the Company's option plans at December 31, 2018 and changes during the year ended December 31, 2018 were as follows.

	Number of Options	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Term (years)	Aggregate Intrinsic Value
Options outstanding at December 31, 2017	2,346	$2,103.20		$ -
Granted	–	–		
Canceled or forfeited	(33)	876		
Exercised	-	-		
Options outstanding at December 31, 2018	2,313	$2,358.44	6.87	$ -
Options exercisable at December 31, 2018	1,922	$2,545.98	6.61	$ -
Options vested and expected to vest at December 31, 2018	2,313	$2,358.44	6.87	$ -

The aggregate intrinsic values in the table above represent the total pre-tax intrinsic values (the difference between the closing price of Gevo's common stock on the last trading day of the 2018 calendar year and the exercise price, multiplied by the number of in-the-money stock option shares) that would have been received by the option holders had all in-the-money outstanding stock options been exercised on December 31, 2018. The total intrinsic value of options exercised during the years ended December 31, 2018, 2017, and 2016 was zero.

The following table summarizes information associated with outstanding and exercisable stock options at December 31, 2018.

		Options Outstanding			Options Exercisable		
Range of Exercise Prices		Number of Options	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Life in Years	Number of Options	Weighted-Average Exercise Price	Weighted-Average Remaining Contractual Life in Years
$0.00	to $11,484	2,246	$ 475	7.06	1,855	$ 569	6.82
$11,485	to $22,968	18	$ 17,869	1.14	18	$ 17,869	1.14
$45,936	to $57,420	13	$ 56,460	0.21	13	$ 56,460	0.21
$57,421	to $68,904	18	$ 60,457	0.18	18	$ 60,457	0.18
$68,905	to $80,348	7	76,020	1.66	7	76,020	1.66
$91,872	to $103,356	8	$ 98,442	0.91	8	$ 98,442	0.91
$103,357	to $114,840	3	$ 106,001	<.01	3	$ 106,001	<.01
		2.313	$ 2,097	6.88	1,922	$ 2,517.03	6.61

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GEVO, INC.

Notes to Consolidated Financial Statements (Continued)

As of December 31, 2018, approximately $0.01 million of total unrecognized compensation cost related to stock options is expected to be recognized as an expense by the Company in the future over a weighted-average period of approximately one year.

There is a maximum contractual term of 10 years for the share options. The Company settles stock option exercises with newly issued common shares. No tax benefits were realized by the Company in connection with these exercises as the Company maintains net operating loss carryforwards and has established a valuation allowance against the entire tax benefit.

Restricted Stock. The Company periodically grants restricted stock awards to employees and directors. The vesting period for restricted stock awards granted may be based upon a service period or based upon the attainment of performance objectives. The Company recognizes stock-based compensation over the vesting period, generally three to six years, for awards that vest based upon a service period. For performance based restricted stock awards, the Company recognizes expense over the requisite service period.

Non-vested restricted stock awards at December 31, 2018 and changes during the year ended December 31, 2018 were as follows.

	Number of Shares	Weighted-Average Grant-Date Fair Value
Non-vested at December 31, 2017	155	$ 876.00
Granted	290,300	3.45
Vested	(155)	876.00
Canceled or forfeited	-	-
Non-vested at December 31, 2018	290,300	$ 3.45

The total fair value of restricted stock that vested during the years ended December 31, 2018, 2017 and 2016, respectively, was $0.5 million, $0.2 million, and $0.3 million, respectively. As of December 31, 2018, the total unrecgognized compensation expense, net of estimated forfeitures, relating to restricted stock awards was $0.6 million, which is expected to be recognized over the remaining weighted-average period of approximately seven months.

Stock Appreciation Rights. The Company granted 132,559 stock appreciation rights valued at an aggregate of $0.6 million, on the respective dates of grant during the year ended December 31, 2018. The vesting period for stock appreciation rights granted are based upon a service period. The stock appreciation rights have the potential to be cash settled in the event there are insufficient shares available from the 2010 Plan and are therefore classified as a liability and remeasured at each reporting period.

The following table sets forth the Black-Scholes option pricing model assumptions and resulting grant date fair value for stock appreciation rights granted and at December 31, 2018. There were no stock appreciation rights granted during the years ended December 31, 2017 and 2016.

	December 31, 2018		**Grant Date(1)**	
Risk-free interest rate	2.54	%	2.84	%
Expected dividend yield	–		–	
Expected volatility factor	134.17	%	125.03	%
Expected option life (in years)	5.75		5.75	
Weighted average grant date fair value	$ 1.65		$4.53	

(1) Stock appreciation rights were granted on May 2, 2018 and August 9, 2018. The values reported above are the weighted-average grant date value. The weighted-average strike price was $5.23 per share.

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Notes to Consolidated Financial Statements (Continued)

12. Income Taxes

There is no provision for income taxes because the Company has incurred operating losses since inception. As of December 31, 2018, the Company had federal and state net operating loss carryforwards of approximately $378.3 million and $355.3 million, respectively, which may be used to offset future taxable income. The Company also had federal research and development tax credit carryforwards and other federal tax credit carryforwards which aggregate to $3.5 million at December 31, 2018. These carryforwards expire at various times through 2038 and may be limited in their annual usage by Section 382 of the Internal Revenue Code, as amended, relating to ownership changes.

The following table sets forth the tax effects of temporary differences that give rise to significant portions of the Company's net deferred tax assets (in thousands).

	December 31,	
	2018	**2017**
Deferred tax assets, net:		
Net operating loss carryforwards	$103,612	$100,631
Research and other credits	3,482	3,482
Other temporary differences	3,760	3,266
Deferred tax assets - before valuation allowance	110,854	107,379
Valuation allowance	(110,854)	(107,379)
Net deferred tax assets - after valuation allowance	$–	$–

The Company recognizes uncertain tax positions net, against any operating losses or applicable research credits as they arise. Currently, there are no uncertain tax positions recognized at December 31, 2018. The Company has provided a full valuation allowance on its deferred tax assets at December 31, 2018 and 2017, as management believes it is more likely than not that the related deferred tax asset will not be realized. The reported amount of income tax expense differs from the amount that would result from applying domestic federal statutory tax rates to pretax losses, primarily because of changes in the valuation allowance.

The following table sets forth reconciling items from income tax computed at the statutory federal rate.

	Year Ended December 31,		
	2018	2017	2016
Federal income tax at statutory rate	21.0 %	35.0 %	35.0 %
State income taxes, net of federal benefits	6.2 %	7.5 %	2.9 %
Research and other credits	0.0 %	0.0 %	(5.8 %)
Impact of change in statutory tax rates	(8.8 %)	(183.8%)	0.0 %
Permanent deductions	(3.7 %)	7.5 %	(18.0%)
Valuation allowance	(14.7%)	133.8 %	(14.1%)
Effective tax rate	0.0 %	0.0 %	(0.0 %)

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Accounting literature regarding liabilities for unrecognized tax benefits provides guidance for the recognition and measurement in financial statements of uncertain tax positions taken or expected to be taken in a tax return. The Company's evaluation was performed for the tax periods from inception to December 31, 2018, which remain subject to examination by major tax jurisdictions as of December 31, 2018.

The Company may from time to time be assessed interest or penalties by major tax jurisdictions, although there have been no such assessments historically, with any material impact to its financial results. The Company would recognize interest and penalties related to unrecognized tax benefits within the income tax expense line in the accompanying consolidated statements of operations. Accrued interest and penalties would be included within the related tax liability line in the consolidated balance sheets.

In December 2017, the federal government of the United States of America passed the "Tax Cuts and Jobs Act". The Company has evaluated the impact, if any, on the Company's financial statements, including tax disclosures. As of December 31, 2018, the Company does not consider the new tax reform to materially impact to the Company's financial statements except for certain reductions in the estimated valuation of net operating loss carryforwards and the associated offsetting valuation allowance.

13. Employee Benefit Plan

The Company's employees participate in the Gevo, Inc. 401(k) Plan (the "401(k) Plan"). Subject to certain eligibility requirements, the 401(k) Plan covers substantially all employees after three months of service with quarterly entry dates. Employee contributions are deposited by the Company into the 401(k) Plan and may not exceed the maximum statutory contribution amount. The Company may make matching and/or discretionary contributions to the 401(k) Plan. Effective January 2013, the Company elected to cease providing an employer match.

14. Commitments and Contingencies

Legal Matters. From time to time, the Company has been and may again become involved in legal proceedings arising in the ordinary course of its business. The Company is not aware of any pending or threatened litigation against the Company that it believes could have a material adverse effect on its business, operating results, financial condition or cash flows.

Leases. The Company has no capital lease obligations outstanding as of December 31, 2018 and 2017, respectively.

The Company has an operating lease for its office, research, and production facility in Englewood, Colorado (the "Colorado Facility") with a term expiring in July 2021. The Company also maintains corporate apartments in Colorado, which have lease terms expiring during the next 12 months. The Company maintains operating leases for rail cars used by Agri-Energy in Luverne, Minnesota. These leases expire between July 2019 and July 2020.

Rent expense for the years ended December 31, 2018, 2017 and 2016 was $1.7 million, $1.6 million, and $1.7 million, respectively. The Company recognizes rent expense on its operating leases on a straight-line basis.

The table below shows the future minimum payments under non-cancelable operating leases at December 31, 2018 (in thousands).

	Operating Leases
2019	$ 1,414
2020	655
2021	218
2022	-
2023	-
Thereafter	-
Total	$ 2,287

Indemnifications. In the ordinary course of its business, the Company makes certain indemnities under which it may be required to make payments in relation to certain transactions. As of December 31, 2018 and 2017, the Company did not have any liabilities associated with indemnities.

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Notes to Consolidated Financial Statements (Continued)

In addition, the Company, as permitted under Delaware law and in accordance with its amended and restated certificate of incorporation and amended and restated bylaws, indemnifies its officers and directors for certain events or occurrences, subject to certain limits, while the officer or director is or was serving at the Company's request in such capacity. The duration of these indemnifications, commitments, and guarantees varies and, in certain cases, is indefinite. The maximum amount of potential future indemnification is unlimited; however, the Company has a director and officer insurance policy that may enable it to recover a portion of any future amounts paid. The Company accrues for losses for any known contingent liability, including those that may arise from indemnification provisions, when future payment is probable. No such losses have been recorded to date.

Environmental Liabilities. The Company's operations are subject to environmental laws and regulations adopted by various governmental authorities in the jurisdictions in which it operates. These laws require the Company to investigate and remediate the effects of the release or disposal of materials at its locations. Accordingly, the Company has adopted policies, practices and procedures in the areas of pollution control, occupational health and the production, handling, storage and use of hazardous materials to prevent material environmental or other damage, and to limit the financial liability which could result from such events. Environmental liabilities are recorded when the Company's liability is probable and the costs can be reasonably estimated. No environmental liabilities have been recorded as of December 31, 2018.

15. Fair Value Measurements and Fair Value of Financial Instruments

Accounting standards define fair value, outline a framework for measuring fair value, and detail the required disclosures about fair value measurements. Under these standards, fair value is defined as the price that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants at the measurement date in the principal or most advantageous market. Standards establish a hierarchy in determining the fair market value of an asset or liability. The fair value hierarchy has three levels of inputs, both observable and unobservable. Standards require the utilization of the highest possible level of input to determine fair value.

- Level 1 – inputs include quoted market prices in an active market for identical assets or liabilities.

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Level 2 – inputs are market data, other than Level 1, that are observable either directly or indirectly. Level 2 inputs include quoted market prices for similar assets or liabilities, quoted market prices in an inactive market, and other observable information that can be corroborated by market data.

- Level 3 – inputs are unobservable and corroborated by little or no market data.

These tables present the carrying value and fair value, by fair value hierarchy, of the Company's financial instruments, excluding cash and cash equivalents, accounts receivable and accounts payable; as carrying value approximately fair value due to their short-term nature; at December 31, 2018 and 2017, respectively (in thousands).

	Fair Value Measurements at December 31, 2018 (In thousands)			
	Fair Value at December 31, 2018	**Quoted Prices in Active Markets for Identical Assets (Level 1)**	**Significant Other Observable Inputs (Level 2)**	**Significant Unobservable Inputs (Level 3)**
Recurring:				
Derivative Warrant Liability	$ 22	$-	$ -	$ 22
2020 Notes Embedded Derivative Liability	394	-	-	394
Total Recurring Fair Value Measurements	$ 416	$-	$ -	$ 416
Nonrecurring				
Corn and finished goods inventory	$ 1,047	$29	$ 1,018	$ -
	$ 1,047	$29	$ 1,018	$ -

	Fair Value Measurements at December 31, 2017 (In thousands)			
	Fair Value at	**Quoted Prices in**	**Significant Other**	**Significant Unobservable**

	December 31, 2017	Active Markets for Identical Assets (Level 1)	Observable Inputs (Level 2)	Inputs (Level 3)
Recurring:				
Derivative Warrant Liability	$ 1,951	$-	$ -	$ 1,951
2020 Notes Embedded Derivative Liability	5,224	-	-	5,224
Total Recurring Fair Value Measurements	$ 7,175	$-	$ -	$ 7,175
Nonrecurring				
Corn and finished goods inventory	$ 1,916	$189	$ 1,727	$ -
	$ 1,916	$189	$ 1,727	$ -

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GEVO, INC.

Notes to Consolidated Financial Statements (Continued)

	Fair Value Measurements Using Significant Unobservable Inputs (Level 3) (in thousands) 2020	
	Derivative Warrant Liability	Embedded Derivative Liability
Opening Balance	$1,951	$ 5,224
Transfers into Level 3	–	–
Transfers out of Level 3	–	–
Total (gains) or losses for the period		
Included in earnings	2,976	(2,637)
Included in other comprehensive income	–	–
Purchases, issues, sales and settlements		
Purchases	–	–
Issues	–	–
Sales	–	–
Settlements	(4,905)	(2,193)
Closing balance	$22	$ 394

Fair Value Methodology

Inventories. The Company records its corn inventory at fair value only when the Company's cost of corn purchased exceeds the market value for corn. The Company determines the market value of corn and dry distiller's grain based upon Level 1 inputs using quoted market prices. The Company records its ethanol, isobutanol and hydrocarbon inventory at market using Level 2 inputs.

2020 Notes. The Company has estimated the fair value of the 2020 Notes to be $13.5 million at June 20, 2017, the date the Company exchanged the 2017 Notes for the 2020 Notes, utilizing a binomial lattice model. The Company has elected to account for the 2020 Notes using the amortized cost method and reported at $12.6 million, net of debt discount and issuance costs at December 31, 2018.

2020 Notes Embedded Derivative. The Company had estimated the fair value of the embedded derivative on a stand-alone basis to be $0.4 million at December 31, 2018 based upon Level 3 inputs. See Note 7, Embedded Derivatives and Derivative Warrant Liabilities, for the fair value inputs used to estimate the fair value of the 2020 Notes with and without the embedded derivative and the fair value of the embedded derivative.

Derivative Warrant Liability. Prior to 2017, the Company estimated the fair value of the Series A, Series F and Series K warrants using a Monte-Carlo model (Level 3). For all other warrants the Company valued these using a standard Black-Scholes model (Level 2). However, beginning in the first quarter 2017, the Company valued the Series F and K using a Monte-Carlo model (Level 3) and other warrants using Black-Scholes models comprised of some inputs requiring the use of Monte-Carlo models (Level 3). The Company has estimated the fair value of the derivative warrant liability to be $0.02 million as of December 31, 2018.

While the Company believes that its valuation methods are appropriate and consistent with other market participants, it recognizes that the use of different methodologies or assumptions to determine the fair value of certain financial instruments could result in a different estimate of fair value at the reporting date.

16. Segments

The Company has determined that it has two operating segments: (i) Gevo, Inc. segment; and (ii) Gevo Development/Agri-Energy segment. The Company organizes its business segments based on the nature of the products and services offered through each of its consolidated legal entities. Transactions between segments are eliminated in consolidation.

Gevo Segment. The Gevo segment is responsible for all research and development activities related to the future production of isobutanol, including the development of the Company's proprietary biocatalysts, the production and sale of renewable jet and other fuels, the Retrofit process and the next generation of chemicals and biofuels that will be based on the Company's isobutanol technology. The Gevo segment also develops, maintains and protects its intellectual property portfolio, develops future markets for its isobutanol and provides corporate oversight services.

Gevo Development/Agri-Energy. The Gevo Development/Agri-Energy segment is currently responsible for the operation of the Luverne Facility and the production of ethanol, isobutanol and related products.

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GEVO, INC.

Notes to Consolidated Financial Statements (Continued)

The Company's chief operating decision maker is provided with and reviews the financial results of each of the Company's consolidated legal entities, Gevo, Inc., Gevo Development, LLC, and Agri-Energy, LLC. The Company organizes its business segments based on the nature of the products and services offered through each of its consolidated legal entities. All revenue is earned, and all assets are held, in the U.S.

	Year Ended December 31,		
	2018	**2017**	**2016**
Revenues from external customers:			
Gevo	$1,222	$1,097	$2,425
Gevo Development / Agri-Energy	31,641	26,439	24,788
Consolidated	$32,863	$27,536	$27,213
Loss from operations:			
Gevo	$(11,552)	$(10,603)	$(11,045)
Gevo Development / Agri-Energy	(10,649)	(12,679)	(12,940)
Consolidated	$(22,201)	$(23,282)	$(23,985)
Interest expense:			
Gevo	$3,237	$2,951	$7,789
Gevo Development / Agri-Energy	-	-	48
Consolidated	$3,237	$2,951	$7,837
Depreciation and amortization expense:			
Gevo	$269	$473	$738
Gevo Development / Agri-Energy	6,251	6,168	6,009
Consolidated	$6,520	$6,641	$6,747
Acquisitions of plant, property and equipment:			
Gevo	$27	$120	$350
Gevo Development / Agri-Energy	3,096	1,786	5,588
Consolidated	$3,123	$1,906	$5,938

	December 31,	
	2018	**2017**
Total assets:		
Gevo	$105,379	$87,507
Gevo Development / Agri-Energy	140,982	149,758

Intercompany eliminations (1)	(139,326)	(148,412)
Consolidated (2)	$107,035	$88,853

(1) Includes intercompany sales of $0.1 million and $0.4 million, respectively for hydrocarbon sales.

(2) All other significant non-cash items relate to the activities of Gevo.

17. Subsequent Events

None noted except those events described below and in Note 1 to the consolidated financial statements for the year ended December 31, 2018.

HCS Group GmbH – In February 2019, the Company entered into a long-term, “take or pay” renewable isooctane purchase and sale agreement with HCS Group GmbH ("HCS") supply renewable isooctane. The Company believes that this long-term, “take or pay” purchase and sale agreement with HCS is an important step forward in our previously-announced strategy to build out the Company's advanced biofuels production facility in Luverne, Minnesota to increase the production of isobutanol and renewable jet fuel and isooctane derived from renewable isobutanol.

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Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

Evaluation of Disclosure Controls and Procedures

We maintain disclosure controls and procedures, as such term is defined in Rules 13a-15(e) and 15d-15(e) under the Exchange Act, that are designed to provide reasonable assurance that information required to be disclosed by us in the reports that we file or submit under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the SEC rules and regulations, and that such information is accumulated and communicated to our management, including our Chief Executive Officer and Principal Financial Officer, as appropriate, to allow timely decisions regarding required financial disclosures. In designing and evaluating the disclosure controls and procedures, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable assurance of achieving the desired control objectives, and management is required to apply its judgment in evaluating the cost benefit relationship of possible controls and procedures.

Based on their evaluation as of December 31, 2018, our Chief Executive Officer and Principal Financial Officer concluded that our disclosure controls and procedures were effective as of December 31, 2018.

Management’s Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting, as defined in Rules 13a-15(f) and 15d-15(f) of the Exchange Act. Our internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. Our internal control over financial reporting includes those policies and procedures that (i) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of our assets; (ii) provide reasonable assurance that transactions are recorded to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the Company are made only in accordance with authorizations of our management and directors; and (iii) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use or disposition of our assets that could have a material effect on our financial statements.

Because of its inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that the degree of compliance with the policies or procedures may deteriorate.

Under the supervision and with the participation of our management, including our Chief Executive Officer and Principal Financial Officer, we conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework set forth in *Internal Control—Integrated Framework* (2013 framework) issued by the Committee of Sponsoring Organizations of the Treadway Commission. Based upon the results of the evaluation, our management concluded that our internal control over financial reporting was effective as of December 31, 2018..

Changes in Internal Control Over Financial Reporting

There were no changes in our internal control over financial reporting during the quarter ended December 31, 2018 that have materially affected, or reasonably likely to materially affect, our internal control over financial reporting.

Item 9B. Other Information

None

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PART III

Item 10. Directors, Executive Officers and Corporate Governance

The information required by this item is incorporated by reference to our definitive proxy statement for the 2019 annual meeting of stockholders to be filed with the SEC within 120 days after our fiscal year ended December 31, 2018.

Item 11. Executive Compensation

The information required by this item is incorporated by reference to our definitive proxy statement for the 2019 annual meeting of stockholders to be filed with the SEC within 120 days after our fiscal year ended December 31, 2018.

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

The information required by this item is incorporated by reference to our definitive proxy statement for the 2019 annual meeting of stockholders to be filed with the SEC within 120 days after our fiscal year ended December 31, 2018.

Item 13. Certain Relationships and Related Transactions, and Director Independence

The information required by this item is incorporated by reference to our definitive proxy statement for the 2019 annual meeting of stockholders to be filed with the SEC within 120 days after our fiscal year ended December 31, 2018.

Item 14. Principal Accounting Fees and Services

The information required by this item is incorporated by reference to our definitive proxy statement for the 2019 annual meeting of stockholders to be filed with the SEC within 120 days after our fiscal year ended December 31, 2018.

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PART IV

Item 15. Exhibits and Financial Statement Schedules

(a)(1) Financial Statements

The following consolidated financial statements are included:

	Page
Report of Independent Registered Public Accounting Firm	54
Consolidated Balance Sheets	55
Consolidated Statements of Operations	56
Consolidated Statements of Stockholders' Equity	57
Consolidated Statements of Cash Flows	58
Notes to Consolidated Financial Statements	61

(a)(2) Financial Statement Schedules

All financial statement schedules have been omitted because they are not applicable or are not required, or because the information required to be set forth therein is included in the consolidated financial statements or notes thereto.

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(a)(3) Exhibits

Exhibit No.	Description	Incorporated by Reference				Filed Herewith
		Form	File No.	Filing Date	Exhibit	
3.1	Amended and Restated Certificate of Incorporation of Gevo, Inc.	10-K	001-35073	March 29, 2011	3.1	
3.2	Certificate of Amendment to the Amended and Restated Certificate of Incorporation of Gevo, Inc.	8-K	001-35073	June 10, 2013	3.1	
3.3	Certificate of Amendment to Amended and Restated Certificate of Incorporation of Gevo, Inc.	8-K	001-35073	July 9, 2014	3.1	
3.4	Certificate of Amendment to Amended and Restated Certificate of Incorporation of Gevo, Inc.	8-K	001-35073	April 22, 2015	3.1	
3.5	Certificate of Amendment to Amended and Restated Certificate of Incorporation of Gevo, Inc.	8-K	001-35073	January 6, 2017	3.1	
3.6	Certificate of Amendment to Amended and Restated Certificate of Incorporation of Gevo, Inc.	8-K	001-35073	June 4, 2018	3.1	
3.7	Amended and Restated Bylaws of Gevo, Inc.	10-K	001-35073	March 29, 2011	3.2	
4.1	Form of the Gevo, Inc. Common Stock Certificate.	S-1	333-168792	January 19, 2011	4.1	
4.2	Fifth Amended and Restated Investors' Rights Agreement, dated March 26, 2010.	S-1	333-168792	August 12, 2010	4.2	
4.3†	Stock Issuance and Stockholder's Rights Agreement, dated July 12, 2005, by Institute of Technology.	S-1	333-168792	August 12, 2010	4.3	

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Exhibit No.	Description	Incorporated by Reference				Filed Herewith
		Form	File No.	Filing Date	Exhibit	
4.4	Exchange and Purchase Agreement, dated April 19, 2017, by and among Gevo, Inc., the guarantors party thereto, the holders named in Schedule I thereto, and Whitebox Advisors LLC, in its capacity as representative of the holders .	8-K	001-35073	April 20, 2017	4.1	
4.5	Indenture, dated June 20, 2017, by and among Gevo, Inc., the guarantors party thereto, and Wilmington Savings Fund Society, FSB, as trustee and collateral trustee .	8-K	001-35073	June 20, 2017	4.1	
4.6	Registration Rights Agreement, dated June 20, 2017, by and among Gevo, Inc. and the investors named therein .	8-K	001-35073	June 20, 2017	4.2	
4.7	Common Stock Unit Warrant Agreement, dated August 5, 2014, by and between Gevo, Inc. and the American Stock Transfer & Trust Company, LLC .	8-K	001-35073	August 6, 2014	4.1	
4.8	2015 Common Stock Unit Series A Warrant Agreement, dated August 5, 2014, by and between Gevo, Inc. and the American Stock Transfer & Trust Company, LLC .	8-K	001-35073	February 4, 2015	4.1	
4.9	2015 Common Stock Unit Series C Warrant Agreement, dated May 19, 2015, by and between Gevo, Inc. and the American Stock Transfer & Trust Company LLC .	8-K	001-35073	May 20, 2015	4.1	
4.10	Form of Series D Warrant to Purchase Common Stock.	8-K	001-35073	December 15, 2015	4.1	
4.11	Form of Amendment No. 1 to Series D Warrant.	8-K	001-35073	June 13, 2016	4.3	
4.12	Form of Series F Warrant to Purchase Common Stock.	8-K	001-35073	April 5, 2016	4.1	
4.13	Form of Series I Warrant to Purchase Common Stock.	8-K	001-35073	September 15, 2016	4.1	
4.14	Form of Series K Warrant to Purchase Common Stock.	8-K	001-35073	February 22, 2017	4.1	

10.1†	Ethanol Purchasing and Marketing Agreement, dated April 1, 2009, by and between C&N Ethanol Marketing Corporation and Agri-Energy, LP.	S-1	333-168792	November 4, 2010	10.26
10.2†	Ethanol and Isobutanol Purchase and Marketing Agreement, dated February 16, 2018, between Eco-Energy, LLC and Agri-Energy, LLC.	8-K	001-35073	February 22, 2018	10.1
10.3†	License Agreement, dated July 12, 2005, by and between Gevo, Inc. and the California Institute of .	S-1	333-168792	November 4, 2010	10.6
10.4†	Amendment No. 4, dated October 1, 2010, to the License Agreement, by and between Gevo, Inc. and the California Institute of Technology, dated July 12, 2005 .	S-1	333-168792	October 21, 2010	10.10

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Exhibit No.	Description	Incorporated by Reference				Filed Herewith
		Form	File No.	Filing Date	Exhibit	
10.5#	Gevo, Inc. 2006 Omnibus Securities and Incentive Plan.	S-1	333-168792	August 12, 2010	10.11	
10.6#	Form of Stock Option Agreement under the 2006 Omnibus Securities.	S-1	333-168792	August 12, 2010	10.13	
10.7#	Gevo, Inc. Amended and Restated 2010 Stock Incentive Plan.	8-K	001-35073	May 31, 2018	10.1	
10.8#	Form of Restricted Stock Unit Agreement under the Amended and Restated 2010 Stock Incentive Plan.	S-1	333-168792	January 19, 2011	10.15	
10.9#	Form of Restricted Shares Award Agreement under the Amended and Restated 2010 Stock Incentive Plan.	10-Q	001-35073	August 8, 2018	10.7	
10.10#	Form of Stock Option Award Agreement under the Amended and Restated 2010 Stock Incentive Plan.	10-Q	001-35073	August 8, 2018	10.6	
10.11#	Form of Stock Appreciation Rights Award Agreement under the Amended and Restated 2010 Stock Incentive Plan	10-Q	001-35073	August 8, 2018	10.8	
10.12#	Gevo, Inc. Employee Stock Purchase Plan.	S-8	333-172771	March 11, 2011	4.7	
10.13#	Gevo, Inc. Executive Health Management Plan.	10-Q	001-35073	November 2, 2011	10.1	
10.14#	Form of Indemnification Agreement between Gevo, Inc. and its directors and officers.	S-1	333-168792	January 19, 2011	10.33	
10.15#	Employment Agreement, dated June 4, 2010, by and between Gevo, Inc. and Patrick Gruber.	S-1	333-168792	November 4, 2010	10.14	
10.16#	Amendment Agreement, dated December 21, 2011, by and between and Patrick Gruber.	8-K	001-35073	December 27, 2011	10.1	
10.17#	Second Amendment Agreement, dated February 16, 2015, by and between Gevo, Inc. and Patrick Gruber.	8-K	001-35073	February 17, 2015	10.1	
10.18#	Employment Agreement, dated June 4, 2010, by and between Gevo, Inc. and Christopher Ryan.	S-1	333-168792	November 4, 2010	10.16	

10.19#	Offer of Employment Letter, dated December 21,2015, by and between Gevo, Inc. and Geoffrey T. Williams, Jr.	10-Q	001-35073	May 9, 2017	10.1
10.20#	Change of Control Agreement for Geoffrey T. Williams, Jr., dated February 18, 2016.	10-Q	001-35073	May 9, 2017	10.2
10.21	Offer Letter, dated January 5, 2018, by and between Gevo, Inc. and Bradford K. Towne.	8-K	001-35073	January 10, 2018	10.1
10.22†	Lease of Space, dated September 13, 2012, between Hines REIT 345 Inverness Drive, LLC and Gevo, Inc.	10-K	001-35073	March 26, 2013	10.48
10.23†	Price Risk Management, Origination and Merchandising and between Agri-Energy, LLC and FCStone Merchant Services, LLC.	10-Q	001-35073	August 7, 2015	10.3
10.24	Grain Bin Lease Agreement, dated June 1, 2015, by and between Agri-Energy, LLC and FCStone Merchant Services LLC.	10-Q	001-35073	August 7, 2015	10.4

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Exhibit No.	Description	Incorporated by Reference				Filed Herewith
		Form	File No.	Filing Date	Exhibit	
10.25	Unsecured Guaranty Agreement, dated June 1, 2015, by Gevo, Inc. in favor of FCStone Merchant Services, LLC	10-Q	001-35073	August 7, 2015	10.5	
10.26†	First Amendment to Grain Bin Lease Agreement, dated December 21, 2017, Agri-Energy, LLC and FCStone Merchant Services, LLC.	10-K	001-35073	March 28, 2018	10.27	
10.27	Second Amendment to the Grain Bin Lease Agreement, dated May 1, 2018, between Agri-Energy LLC, and FCStone Merchant Services, LLC.	10-Q	001-35073	August 8, 2018	10.5	
10.28†	First Amendment to Price Risk Management, Origination and Merchandising Agreement, dated December 21, 2017, Agri-Energy, LLC and FCStone Merchant Services, LLC.	10-K	001-35073	March 28, 2018	10.28	
10.29†	Settlement Agreement and Mutual Release, dated August 22, 2015, by and among Gevo, Inc., Butamax Advanced Biofuels, LLC, E.I. du Pont de Nemours & Company and BP Biofuels North America LLC.	10-Q	001-35073	November 5, 2015	10.2	
10.30†	Patent Cross-License Agreement, dated August 22, 2015, by and between Gevo, Inc. and Butamax Advanced Biofuels LLC.	10-Q	001-35073	November 5, 2015	10.3	
10.31†	Joint Development Agreement, dated November 6, 2015, by and between Gevo, Inc. and Praj Industries Ltd.	8-K	001-35073	November 10, 2015	10.1	
10.32†	Development License Agreement, dated November 6, 2015, by and between Gevo, Inc. and Praj Industries Ltd.	8-K	001-35073	November 10, 2015	10.2	
10.33†	Supplemental Agreement (to Joint Development Agreement), dated November 16, 2017, by and between Gevo, Inc. and Praj Industries Ltd.	8-K	001-35073	November 21, 2017	10.1	
10.34†	Supplemental Agreement (to Development License Agreement), dated November 16, 2017, by and between Gevo, Inc. and Praj Industries Ltd.	8-K	001-35073	November 21, 2017	10.2	

10.35†	Joint Development Agreement, dated February 1, 2016, by and between Gevo, Inc. and Porta Hnos S.A.	8-K	001-35073	February 5, 2016	10.1	
10.36†	Commercial License Agreement, dated February 1, 2016, by and between Gevo, Inc. and Porta Hnos S.A.	8-K	001-35073	February 5, 2016	10.2	
10.37	First Amendment to Lease, effective December 11, 2015, between Hines REIT 345 Inverness Drive, LLC.	10-K	001-35073	March 30, 2016	10.62	
10.38†	Renewable Isooctane Purchase and Sale Agreement, dated February 21, 2019 by and between Gevo, Inc. and HCS Group GmbH.	8-K	001-35073	February 27, 2019	10.1	
10.39	At-The-Market Offering Agreement, dated February 13, 2018, between Gevo, Inc. and H.C. Wainwright & Co., LLC.	8-K	001-35073	February 13, 2018	10.1	
10.40	Amendment to At-The-Market Offering Agreement and Engagement Agreement, dated June 20, 2018, between Gevo, Inc. and H.C. Wainwright & Co., LLC.	8-K	001-35073	June 20, 2018	1.2	
10.41	Amendment to At-The-Market Offering Agreement, dated June 25, 2018, between Gevo, Inc. and H.C. Wainwright & Co., LLC.	8-K	001-35073	June 25, 2018	1.3	
10.42	Amendment to At-The-Market Offering Agreement and Engagement Agreement, dated June 28, 2018, between Gevo, Inc. and H.C. Wainwright & Co., LLC.	8-K	001-35073	June 28, 2018	1.4	
21.1	List of Subsidiaries.	S-1	333-168792	October 1, 2010	10.10	
23.1	Consent of Grant Thornton LLP.					X

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Exhibit No.	Description	Incorporated by Reference				Filed Herewith
		Form	File No.	Filing Date	Exhibit	
31.1	Section 302 Certification of the Principal Executive Officer.					X
31.2	Section 302 Certification of the Principal Financial Officer.					X
32.1	Section 906 Certifications of the Principal Executive Officer and Principal Financial Officer.					X
101	Interactive Data Files Pursuant to Rule 405 of Regulation S-T: (i) Consolidated Balance Sheets at December 31, 2018 and December 31, 2017, (ii) Consolidated Statements of Operations for each of the three years in the period ended December 31, 2018, (iii) Consolidated Statements of Stockholders' Equity for each of the three years in the period ended December 31, 2018, (iv) Consolidated Statements of Cash Flows for each of the three years in the period ended December 31, 2018; and (iv) Notes to the Consolidated Financial Statements.					X

† Certain portions have been omitted pursuant to a confidential treatment request. Omitted information has been filed separately with the SEC.

# Indicates a management contract or compensatory plan or arrangement.

(b) Exhibits

See Item 15(a)(3) above.

(c) Financial Statement Schedules

See Item 15(a)(2) above.

Item 16. Form 10-K Summary

None.

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SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the registrant has duly caused this Report to be signed on its behalf by the undersigned, thereunto duly authorized.

GEVO, INC.

By: /s/ Bradford K. Towne
Bradford K. Towne

Chief Accounting Officer

Date: March 28, 2019

Pursuant to the requirements of the Securities Exchange Act of 1934, this Report has been signed below by the following persons on behalf of the registrant and in the capacities and on the dates indicated:

Signatures	Title	Date
/s/ PATRICK R. GRUBER **Patrick R. Gruber, Ph.D.**	Chief Executive Officer (Principal Executive Officer) and Director	March 28, 2019
/s/ BRADFORD K. TOWNE **Bradford K. Towne**	Chief Accounting Officer (Principal Financial and Accounting Officer)	March 28, 2019
/s/ RUTH I. DREESSEN	Chairman of the Board of Directors	March 28, 2019

Ruth I. Dreessen		
/s/ GARY W. MIZE **Gary W. Mize**	Director	March 28, 2019
Johannes Minho Roth	Director	March 28, 2019
/s/ ANDREW J. MARSH **Andrew J. Marsh**	Director	March 28, 2019
/s/ WILLIAM H. BAUM **William H. Baum**	Director	March 28, 2019