



Renewable chemicals naturally designed and engineered to deliver the performance that adds value to everyday products

## Company Overview

### SUMMARY:

**Green Biologics is a renewable chemicals company focussed on developing and delivering new green alternatives for everyday products.**

Our technology platform is built on biology and chemistry with core expertise in *Clostridium* microbial fermentation. We are using our novel technology platform to develop a robust product pipeline, extending the range of green chemicals and applying downstream synthetic chemistry to generate chemical derivatives used in a wide variety of everyday products (paints, coatings, inks, adhesives, textiles, cosmetics, food ingredients, household and industrial cleaners, shampoos and personal care products, fragrances, synthetic rubber, and a myriad of other end uses).

Green Biologics is transforming the global chemicals market, providing its customers with products and technology that are more sustainable and higher value than petroleum-based alternatives.

### OUR TECHNOLOGY:

Green Biologics has developed a high performance *Clostridium* microbial fermentation platform that can convert a diverse range of sustainable feedstocks into high performance green chemicals. The first products are n-butanol, acetone, and through synthetic chemistry, their derivatives.

It combines:

- World-class *Clostridium* microbiology
- Innovative metabolic engineering and synthetic biology to generate proprietary *Clostridium* microbial biocatalysts with optimal performance to convert industrial sugars into high value chemicals
- Proprietary and commercially scalable advanced fermentation process technologies that provide platform chemicals that can be converted to other high value chemicals through synthetic chemistry
- Utilisation of sustainable feedstocks including agricultural residuals, wastes and other cellulosic feedstocks

Our *Clostridial* technology platform is well positioned to deliver other renewable high value chemicals, beyond butanol. This creates a pipeline of potential new C<sub>3</sub> and C<sub>4</sub> chemical products for our downstream partners

### OUR BUSINESS STRATEGY:

Our strategy is to build, own and operate our own renewable chemical facilities to manufacture butanol and acetone. Our 1<sup>st</sup> generation process will use starch and sugar-based crops as feedstocks, but we are rapidly driving toward 2<sup>nd</sup> generation lignocellulosic feedstocks. Our focus is on renewable C<sub>4</sub> chemicals, but as we bring down our production costs using cellulosic feedstocks we aim to shift our focus toward biofuels. Through collaboration, we aim to utilise synthetic chemistry to produce key derivatives such as butyl esters, butyl acetate, butyl acrylates and butyl glycol ethers.

### OUR CUSTOMERS:

Green Biologics' high performance bio-based solutions and products can benefit customers in a wide range of consumer and industrial products industries (personal care, food ingredients, health and nutrition, household and industrial cleaners, paints and coatings, adhesives, textiles and fabrics, aeroplane brake fluids, heat transfer fluids, safety glass, packaging and polymers, and a myriad of other end uses). Our renewable chemistry offers performance and formulation benefits to a wide range of products that have a positive impact on consumers globally.

### OUR TEAM:

Green Biologics has just over 50 employees worldwide. Most of our employees are world-class scientists with deep expertise in microbiology, metabolic engineering, synthetic biology, biochemistry, and cutting edge microbial R&D. Green Biologics is the global leader in *Clostridium* microbial technology and in advanced high throughput fermentation of sugars utilising *Clostridia* microbial biocatalysts. Our leadership team includes more than 175 years of combined experience in industrial biotechnology, chemicals, and process industries.

### OUR INVESTORS:

Green Biologics Ltd has raised over \$40 million in equity financing from investors and venture capital firms including Sofinnova Partners, Swire Pacific Limited, Capricorn Venture Partners, Oxford Capital Partners, ConVergInce Holdings, the Carbon Trust and Morningside Group.

### OUR LOCATIONS:

Green Biologics Ltd. is based at 45A Western Avenue, Milton Park, Abingdon, Oxon OX14 4RU in Oxfordshire, England. Our laboratories are at this location; our home office is 80F Park Place, Milton Park, Abingdon, Oxon OX14 4RY just a few hundred yards from the lab.

Our U.S. entity is Green Biologics, Inc., based at 1130 Gahanna Parkway, Gahanna, Ohio 43230. Our pilot plant and associated laboratories are at this location; our U.S. commercial offices are located at 319 Business Lane, Suite 1000, Ashland, Virginia 23005.

Our demonstration plant is located in Emmetsburg, Iowa. In late 2013, we announced a purchase agreement on a 23 MGPY ethanol plant in Little Falls, Minnesota. We plan to acquire this plant in 2014 and retrofit the plant to produce n-butanol and acetone, with a planned start-up in 2016.