



LEE ENTERPRISES CONSULTING, INC.  
*World's Premier Bioeconomy Consulting Group*

## **Synthetic Biology Commercialization Qualifications Statement**

The Synthetic Biology Commercialization team of Lee Enterprises Consulting consists of leading business, financial, engineering and other experts in biomaterials. Biomaterials are those materials that are derived from renewable feedstocks using fermentation: food proteins and ingredients, enzymes, organic acids, platform chemicals C1– C6, polymers, plastics, oleochemicals, polyols, agriculture additives, human health additives, animal health additives, and algae platform ingredients.

With an increasing awareness of health and environmental concerns, and the growing demand for greener products, the consumer products industry is moving rapidly to add alternative, bio-based materials to replace hydrocarbon-based products. Finding abundant, cost effective feedstock, and assessing technological innovations are the current keys to this industry that is accelerating due to synthetic biology. As consumer acceptance and government support for these products continues to increase, research and innovation will continue to drive this industry forward. Our experience includes project conceptualization, leadership through process and/or project engineering, commercial strategy including program or project management for bio-chemical production and acting as “Owner’s Engineer” or “Owner’s Project Manager”. We have the expertise and leadership team to support all aspects of scale-up, demonstration, and commercialization.

Areas of commercial, engineering, and technical capability:

Industrial Biotechnology and Fermentation – process development and scale up of fermentation and downstream processes to pilot scale, demonstration scale, and on the design, installation and startup of commercial operations.

Contract scale up and Commercial Operations – Select and manage contracted resources on behalf of the client.

Broad Technical Leadership – Technical strategy and project management across multiple disciplines; organic synthesis, chiral chemistry, biocatalysis, synthetic biology, fermentation and strain development, industrial biotechnology and renewable / bio-based materials. We provide the business and technology alignment ensuring effective execution of client requirements. Specialists for engineering and construction to fill resource gaps.

Commercial and technological assessments – Corporations, venture capital or investment houses that require independent evaluations on the technology underlying an acquisition, investment or funding decision. We generally supply a team including business, market, legal, and of course technical.



Short term or interim expertise – New companies that do not have fulltime technical staff at the executive level, but still require a strategic technical plan. Small or virtual companies that need interim senior staff to implement specific technical projects, or that need to manage projects requiring diverse technologies at separate locations. Established biotech, pharma, and chemical companies that wish to introduce new, interdisciplinary technology and do not yet have the internal organizational structure to do so.

Development of bio-based Products – Design and development of new consumer products. Sourcing and promoting the development of bio-based materials. Identifying new applications and opportunities for bio-based materials. Laboratory to create customized, formulated products based on renewable materials; and perform testing. Design of renewable supply chains for industry & consumer products.

Market Studies – Evaluations of Market size, market share, market segmentation, and supply chain intelligence. Qualitative analysis as well as quantitative analysis typically oriented towards a specific product, material or technology of interest.

Process Technologies – Experience in continuous flow, multistage reactor design. Provide agitation, mixing and bioreactor design, including equipment specification and bid evaluation. Cross platform experience including biofuel conversion process, cellulosic/corn ethanol, biodiesel esterification process, biocatalyst, industrial enzymes, nutraceuticals/supplements, bio-based chemicals, bio lubricants, and biopolymers. CO<sub>2</sub> and gas conversion processing using biotech or catalysis.

Detail design reviews/deployment – Experience with process design, PFD, P&ID, HAZOP and techno-economic simulations using HYSYS Aspen, and the development and optimization of both small, and large integrated process systems including establishing design and operating parameters for commercial versions of prototype systems.

Biomass conversion processes -- Deconstructed lignocellulosic biomass processes followed with enzymic saccharification. Solid knowledge in evaluating numerous biomass conversion process for upgrading to renewable chemicals through biotechnology as well as catalysis.

Report review and preparation – Develop bids and proposals, market assessments, policy evaluations, strategic and tactical business plans.

Technical and business expertise applications -- Assess technical, logistic, regulatory, and finance of projects. Continuously improved business through customer analysis to add value across the supply chain, employing cross-functional teams, establishing action plans and controls to achieve profitable and environmentally sustainable results.



Assist/lead development – Innovated client cost saving solutions based on understanding competitive and conventional markets and processes. Training and workforce improvements.

Collaborations -- Public, commercial, and international organizations delivering high quality products and services. Included is project management and bringing together groups to create alignment.

Accomplished technical and financial analysis – We offer conclusions and recommendations.

Visual and verbal presentations – Concise and crisp technical analyses and summaries.

Relationship leveraging – Company “match-making”. Bringing parties together to have them capitalize on their synergy. Form new business opportunities among investors, clients, clean energy developers, other technical and business consultants.

Interim Executive Leadership – Provide interim business or development leadership during transitions and assist in search and interviewing for replacement personnel.

